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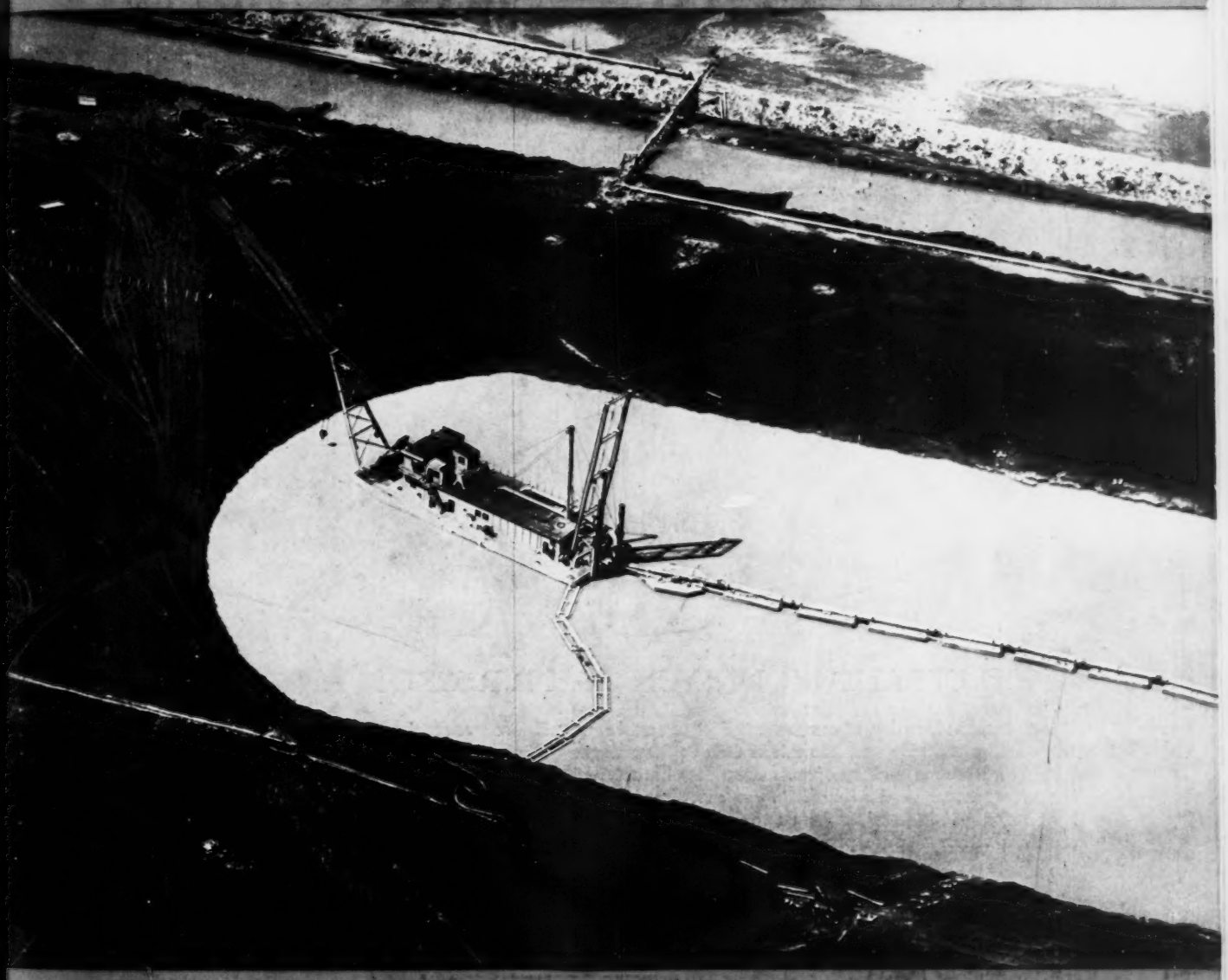

Aerienne Presse-Canadienne.

Hydraulic Dredge Working in the Beauharnois Canal

In this Issue:

Beauharnois Power Project—

A Great Development on the St. Lawrence River

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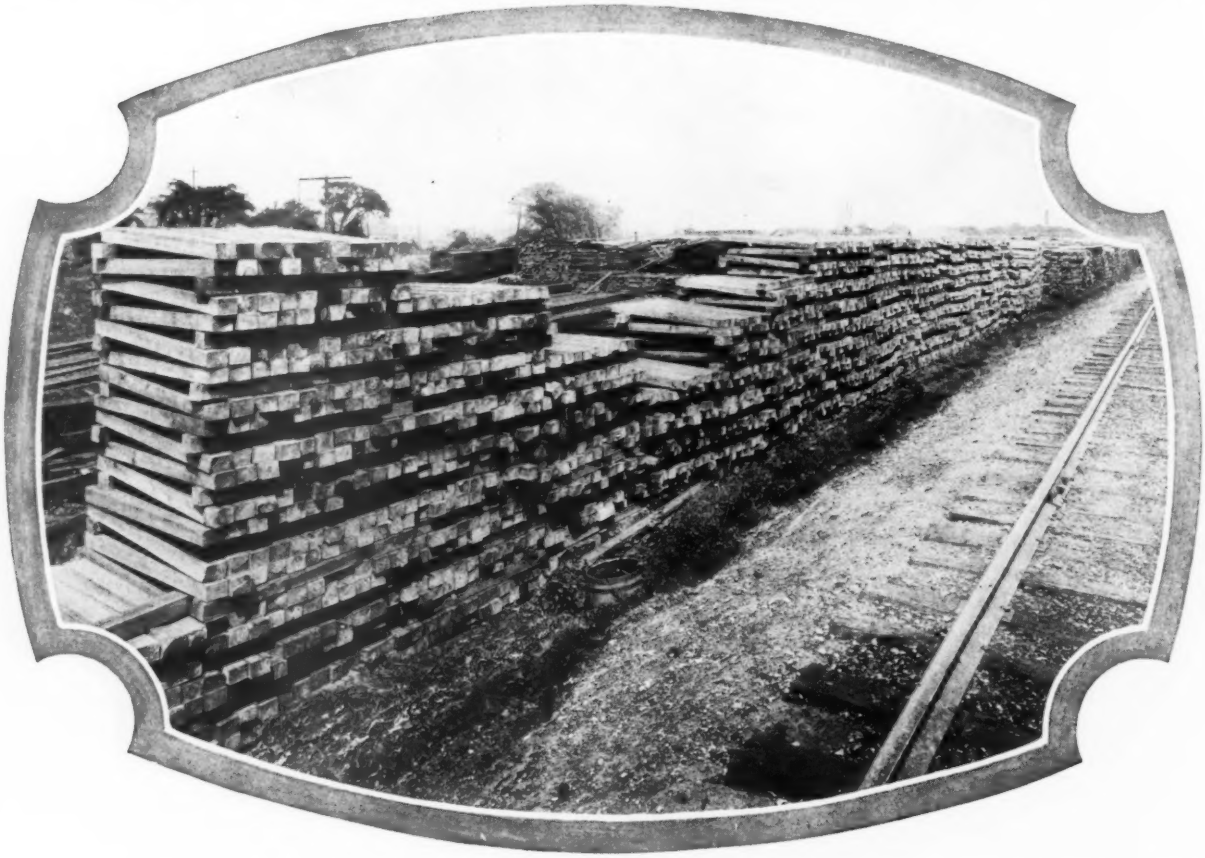

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This Important Subject

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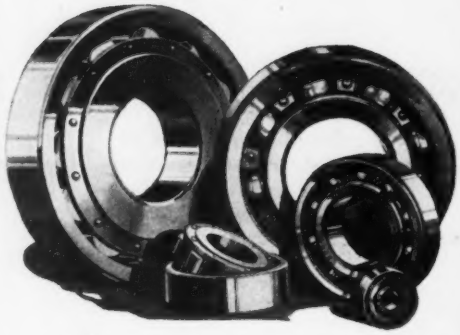

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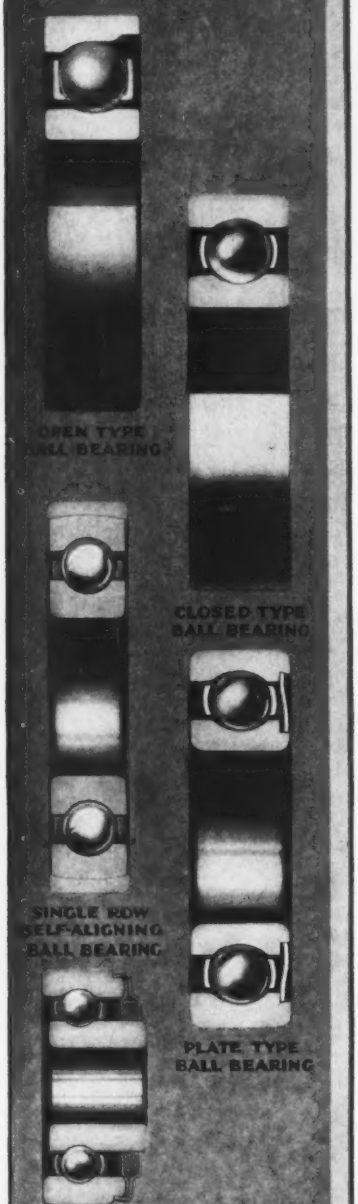
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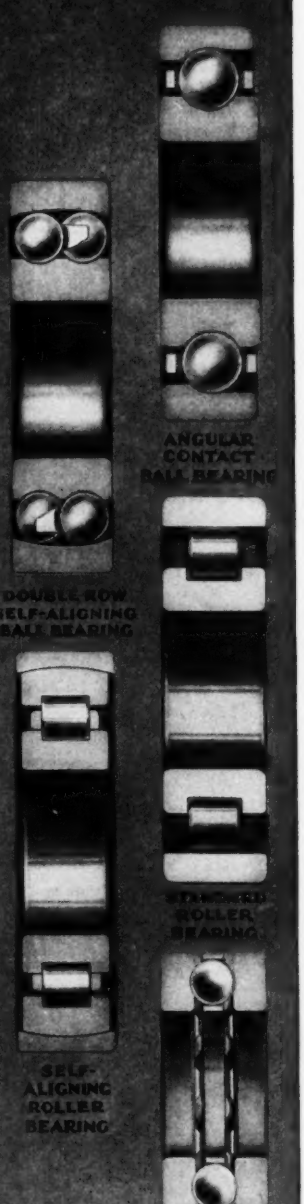

BEARINGS

ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION — ESTABLISHED 1874

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 105 NEW YORK, DECEMBER 11, 1930 Number 24

Steel and Cement

A DISTINCT sensation is stirring the dull business atmosphere as knowledge spreads that some weeks ago most of the cement manufacturers decided to do away with the 10-cents-per-barrel dealer differential, long a sore spot in cement selling. It looked like new, courageous and straight thinking. An equal sensation came this past week, in the form of an announcement of a dollar per ton mark-up in steel prices. This too reflects a new spirit of determination. If we are effectively getting to the point of stubborn resistance to the disintegration of business policies and are looking to sound procedure and self-respecting prices as our reliance for the future, we are on the right course.

Buy Now vs. Sell Now

THROUGHOUT the country the "Buy Now" slogan is being shouted noisily. Putting forward as sales argument the seller's self-interest rather than the buyer's advantage, it ignores the fundamental principles of selling. Because it seeks to promote sales for the sake of the producer rather than for the welfare of the buyer, any movement of this kind is doomed to failure from the start. Let not engineers, contractors or equipment manufacturers stumble into the same pitfall. Let them promote a road because it is sorely needed and will produce a return on the investment, not because they desire the work. In marketing their services or materials let them seek out those places where the service or material is best suited, or find the place where their machine will save money and do a better job for the customer. Unworthy make-work jobs and inappropriate sellers' sales are on a par—they will produce dissatisfaction which will not be forgotten for years. Construction can never hope to thrive on charity pleas.

Use the Library

REMARKABLE as it may seem, engineers out of work are not flocking to the libraries. They are not seeking out engineering literature to broaden their knowledge while resting from the leg-wearying task of job hunting. Possibly they will be found among the all-day customers who crowd the motion picture theaters. In Chicago the meetings of the Western Society of Engineers are attended as never before, but officials report less than normal use of the society's library. Surely the idle engineer cannot put his time between calls to better use than bringing himself up to date on those things recorded by his colleagues in books and magazines for his benefit. Many of them while actively employed must have had problems come up that they knew had been met and solved by others. They wished then that they had the time to do a bit of research. The present offers opportunity for them to recall those difficulties and prepare themselves to solve them efficiently when the opportunity arises.

Backward Cities

MUNICIPAL ignorance has brought forth another flower like that of the Lima case last spring, when competitive bids were asked by public advertisement to secure a consulting engineer for sewage-disposal and river-regulation work. This time San Diego, the quiet, restful city of the Farthest Southwest, asks competitive bids for the design of a sewer system. It applies all the usual trimmings of contract practice: certified check to accompany the bid, surety bond for performance, and all, proof that down in San Diego the city fathers know how to carry on their work in good, tight legal style! Of course engineers know that such bidding is unethical and improper; there is no possibility of offering or measuring fair equivalence of service, just as would be true if lawyers were asked to submit sealed bids for defending the city in a difficult law suit. That it is improper also for the city can hardly fail to be recognized by even the most mediocre business intellect, since the fiction of inviting competition where no competitive measure of offers is available is a hopeless absurdity. But evidently we shall have to wait some further years before enlightenment penetrates all municipal minds.

Chicago Goes Underground

AFTER years of talk and contemplation, Chicago has reached a definite milestone in rapid-transit history. It has finally come forth with structural plans for a subway line, authorized under the transit consolidation project approved by the voters last July. Although the State Street subway is but an underground passage through the Loop for north-and-south elevated lines, its construction will determine matters of policy and design on future expansions of the subway system. Broad questions, such as shallow or deep construction, standard type of structure, ventilation facilities, platform widths and methods of financing, required serious thought in planning this first link, in order that a sound precedent would be established. Chicago was able to profit by the subway experience of other cities. A shallow box structure of the same design long used and proved satisfactory on New York subways, with a modified floor suited to Chicago soil, was adopted as standard. But Chicago is going beyond the ordinary in many refinements of design. Special attention is being given to track and roof design in an effort to reduce the ear-splitting noise reverberation prevalent in New York. Positive forced ventilation is to be used. A single station 3,700 ft. long to serve the entire Loop district is an innovation in subway operation. In matters of financing Chicago is trying

a new method in a combination of local assessment, stock and bond issues, supplemented by a transit fund accumulated under terms of previous franchises. Twenty years late in starting its subway system, the Mid-West metropolis is at last within sight of modern transit development.

Planning for the Future

LACK of vision or lack of funds too frequently limits construction operations to those which will satisfy immediate needs. Future requirements are left to take care of themselves. It is refreshing, therefore, to see the way in which possible future requirements have been used as a guide for present-day operation on the hydroelectric power project now being built on the St. Lawrence River near Beauharnois, Que. The company building the plant controls only a small part of the flow of the river, but as the scheme of development which it is following out appears to be the most economical for that section of the river, it is not impossible that ultimately all the available flow of the river will be used in a single over-all development. As a consequence the project is being built with a view to its ultimate expansion into a great plant developing the entire usable flow and available head in that section of the river. None of the present work, so far as the builders can foresee, will hamper future expansion or add materially to its cost. Present costs are increased somewhat by planning for future needs, but this condition has served chiefly as a challenge to the builders to keep costs within economic limits in order to pave the way for much greater savings in future work. Engineering in its broadest sense is being applied.

Deflationist Counsel

ALL constructive effort throughout the country is being directed toward firm maintenance of wage rates and employment standards. The obvious aim is to avoid the long-continued hard times that would be sure to follow upon a crumbling of the present structure of values. In line with this purpose is a proposal made in several quarters for embodying in contracts a minimum-wage stipulation establishing the lowest rate for common labor and requiring the contractor to do the work under that condition, with proportionately higher scales for skilled labor. The Carolinas section of the Associated General Contractors last week asserted its belief in the wisdom of such a contract provision, and while their reason was the maintenance of sound contracting conditions it is clear that a benefit of much broader character would result. But a discordant note has been sounded in a complaint just made to the Governor of New York by the State Economic Council, a private organization intended "to restore the state's prosperity through sound economic measures." The council complains that construction costs are too high, that construction labor is less efficient than fifteen years ago, and then recommends, over the signature of Merwin K. Hart, its president: "I believe it would be a statesmanlike action for leaders in the building trades as their contribution to our common problem of depression and unemployment to take steps to reduce unit construction costs. Such action might well be for a limited period of time, such as one year; with future action to abide that event." This concealed demand for a reduction of wage rates strikes at the root of the very stability which is a prime objective of all who are seeking to battle through the present state of low business confidence and restore normal conditions of healthy production and exchange. Though it comes from a prominent place, the wage-reduction plea should not mislead anyone into false belief in a downward trend of construction costs. The issue is not between the present low building costs and still lower costs, but between climbing upward to a sound volume of activity or going down the evil descent of disintegrating values.

Bottlenecks

PHYSICAL bottlenecks in roads are plentiful, but even more numerous are the bottlenecks of a legal, financial and political nature which slow the progress of a road improvement project toward the state of finished pavement. As an example, literally millions of dollars are available to relieve bottlenecks in the street and road system in the vicinity of Chicago, but the bottlenecks of delay prevent its spending. Through political jealousies only a meager mileage of state-aid pavement was laid within the city limits this year, though several million dollars was available. Job after job is held up while property owners and their overcautious lawyers squeeze, delay and object to settlements for right-of-way. Proceedings for a straightening improvement in a small north-shore town on a highly congested artery were begun sixteen years ago, but for twelve years the project rested in the condemnation courts; only last week engineers by cajoling, threatening and push succeeded in bringing the transaction to an issue. At the beginning $6,000 was asked and turned down; more than five times that amount was finally paid. Chambers of commerce, improvement associations and make-work committees can do a tremendous service at this time if they will strong-arm the legal profession out of their delay tactics in producing and maintaining bottlenecks in the settlement of right-of-way procedure. Fiscal agents of city governments where money has been voted can speed up bond printing, signing and selling. Legislative bodies can pass quickly on engineers' plans instead of turning them over and over to discover the political advantage. And engineers can help by taking less time for inconsequential details.

Courtesy, Please

FREQUENT complaints come to this journal that letters of application addressed to advertisers who offer technical positions are left without reply or acknowledgment. On the facts the complaints are just. The actions charged may be waived aside as a trifling matter, but they express an absence of good business manner and a disregard of the consideration due others that is serious in its ultimate effect. Though we are sure that the charge lies against only a few and not against engineers as a class, it affects the good repute of the entire profession.

To repeat a well-known principle, neither individual nor class can expect to thrive on ill-mannered conduct. Business dealings of every kind are characterized by mutuality, with all that it implies. Professional engagements even more than commercial transactions have their roots in a state of mutual regard and esteem between the parties. The seeker after employment and the seeker after employees are on even terms, and neither one may with impunity ignore this relation. Because of the present importance of employment activities these considerations have special weight just now.

We know that engineers as a class have a sensitive appreciation of both personal and business courtesy. It

is also true that the individual exceptions will fail as badly in dealings with clients, and generally with interests outside their circle, as in dealings with their colleagues. But before their conduct can obtain its due return it may cast reproach on the profession as a whole. Whoever, therefore, has an opportunity to work for the correction of the conditions mentioned will be furthering his own interests as well as those of his profession by taking action.

Hand Against Machine Work

SHALL hand labor be used in public works? Shall the machine be discarded for a time, while we have so many unemployed? This is a burning question with many city engineers and administrative officials. Some have already answered it in favor of hand labor.

A few random reports may be noted: Minneapolis is planning to use pick-and-shovel men instead of machinery in its winter program of municipal improvements. Boston proposes to abolish the use of snow-loading machines in clearing its streets after a snowfall. Newark has just begun hand excavation in converting the abandoned Morris Canal to a subway roadbed. Akron and Sacramento have put the pick-and-shovel plan into practice. And so the list goes.

There are large possibilities in hand labor as relief of unemployment. Millions of men are out of work—machinists, bookkeepers, carpenters, brokers' clerks, as well as some ditch-diggers. And so are many women. *All of them could be put to work* by using old, slow lathes instead of new ones, discarding plaster and concrete hoists and employing hodcarriers, putting typewriters on the shelf and writing all letters by hand; in short, by going backward in everything. No one has proposed or tried this. Everyone knows that it would clog and stall the entire business mechanism.

We hear of no shop that plans to replace its best machines by hand labor; no office, municipal or private, that has proposed to abandon its typewriters and adding machines in order to give employment to idle office workers; no newspaper that has stopped its linotypes and gone back to hand setting. But the construction art has been selected to make work. Not, it is true, in concrete mixing—no proposal to return to hand mixing has been reported. The big opportunity has been sought exclusively in pick-and-shovel work. Yet this work can take care of only a small number, only few of those who are physically fit for it, and no women at all.

If it is true that the unemployed four or five millions can be put to work by shutting down even a small part of our dishwashers, concrete mixers and the thousands of other modern mechanical aids, and if we recognize that this would be destructive generally, why is it attempted in public-works construction? And further, if it is not applied or even suggested in federal-aid road work, or in the flood-control construction along the Mississippi, why is city work asked to carry the whole of the unnatural burden?

Obviously, the city is the governmental unit which has the direct task of providing relief; hence its seeking for ways to put men to work and get them out of the breadlines. But is the procedure sensible and effective? Consider the case of snow removal. This work demands speediest possible results, to reduce losses from hampered communication and delayed business. In no city can men be gathered after a snowstorm as quickly as wanted for most effective snow clearing. Where mechanical loaders are used, all available men can be put to work, probably more than can be utilized with hand loading, and the streets will be opened at greatest speed. But if the purpose is not that of clearing the streets quickly, but that of keeping the maximum number of men at work as long as possible, hand work has better reason, and if the men were armed with teaspoons in place of snow shovels the plan would be more effective still!

On the other hand, consider the case of Newark. The first section of its canal-subway work is soon to be let under contract, with about 170,000 yards of excavation. The contractor will be free to choose his own tools and methods; but in the month or so before he can begin, the city is putting a thousand men into the ditch, and thereby will take out a third of the total before the contractor gets ready. It thus speeds the completion of the job, gets work going at a time when the canal project would be lying idle, and displaces no machine. The extra cost of a hundred thousand or so dollars is charged not to the job but to relief account, and no fictitious cost burden is laid on the subway. The procedure is intelligent and effective, so far as it goes. It does not help many; it does not help the white-collar worker or the skilled factory hand. But as a fragmentary contribution it does its bit and reduces the extent to which the city's unemployed are brought down to a charity basis.

The two cases cited throw light on the essential fact that conditions and ways of going about the application of hand work may make the step good or evil. But there are few cases where productive work of a kind essentially requiring hand labor can be created. Where direct displacement of machine by hand work is at issue, it is already clear that even in the best case the hand-work plan is inherently unsound.

Any general substitution of hand for machine work will disarrange the existing relations of manufacture and trade, create unemployment at one point to give momentary relief at another, and decrease business and confidence in tomorrow's prospects. By necessitating increased expenditure for a smaller amount of work it will reduce the resources available to provide additional work. It will debilitate and paralyze our business life instead of strengthening it. It will create unemployment faster than it can relieve. And this being so, the attempt to force hand work on a single field of activity, construction, is proportionately harmful to the community, and opposed to the very result sought for, the reduction of unemployment.

Speeding up public-works construction is the surest way of carrying the country through to spring with minimum distress. It cannot be achieved by adopting archaic methods in order to make work for more men out in the open; only the best, quickest and most efficient methods of construction can bring about true speeding up. This course may not utilize as many visible hands, but by providing normal occupation for a widening circle of invisible hands it operates progressively to raise the level of activity everywhere and so restore soonest the normal rate of employment and earning power for all.

Reversion to medievalism is not a cure for our present ills. Progress can result only through maintaining efficiency, using the best ways and tools of working, and thereby spreading the working opportunity over the widest range of enterprise. Abandoning the fruits of progress and heading back toward the jungle is a course to destruction.

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FIG. 1—FOUNDATION WORK ON THE BEAUHARNOIS POWER HOUSE

Construction of the power house is being handled by three traveling gantry cranes shown in this aerial view. Draft tubes are being built in the deep excavation at the left center and the floors of four pairs of intake sluices are being laid on the higher ground. The large shovel is an 8-cu.yd. electric. In the foreground are well drills preparing for the deep tailrace cut.

Beauharnois Power Plant on St. Lawrence River Designed for Full Flow of the Stream

Power Canal Being Dug to Connect Lake St. Francis and Lake St. Louis Sections of St. Lawrence River Designed for Ultimate Enlargement to Take Full Usable Flow of River—83 Ft. of Head Available for Power Development—Provision for Future Navigation Requirements

THE FIRST attempt to develop power on the St. Lawrence River on the scale contemplated in government studies of the power possibilities of the river, such as that of the international joint board of engineers, is now under way in the Soulanges section of the river in Beauharnois County in Quebec. The project is a wholly Canadian undertaking. It is financed by private capital and uses water diverted from the river, under permit from the Canadian government. The initial undertaking contemplates using only a portion of the normal flow of the river for the development of approximately 500,000 hp.

In its conception the project differs widely from any previously attempted on the St. Lawrence River, in that the initial work is being laid out so that the development may in the future be enlarged at a minimum of expense to take the entire usable flow of the river in the rapids between Lake St. Francis and Lake St. Louis. All former power developments on the St. Lawrence River have been by side diversion of a small portion of the flow into low-head plants.

The necessary magnitude of any scheme of complete development of an entire section of the river heretofore has effectively prevented the undertaking of anything other than such partial developments. Now, however, as large blocks of power can be more readily disposed of than was possible a few years ago, magnitude is less of a deterrent. Nevertheless, the amount of work involved in even the initial stage of the complete development is such as to require that unit costs be very carefully controlled in order to keep the cost per horsepower of the initial output within the limits of marketability.

Present Project—The plan of the project now under construction is shown in Fig. 3. Its principal feature is a wide intake canal 15½ miles long, starting in Lake St. Francis and extending across the relatively flat country between Lake St. Francis and Lake St. Louis to a forebay above Lake St. Louis near the town of Beauharnois. The power house is to be located across the outer end of the forebay some 1,000 ft. inland from the lake with a tailrace excavated out 500 ft. into the lake to reach deep water. The route of the canal follows closely the route recommended for a ship canal between Lake St. Francis and Lake St. Louis in the Bowden-Wooton report of the international joint commission (1920) and similar reports. The Canadian government has reserved the right to use the intake canal for such a ship canal when so required, and to construct locks from the lower end of the canal down into Lake St. Louis.

The terrain between Lake St. Francis and Lake St. Louis to the south of the St. Lawrence River lends itself admirably to a scheme of development such as is now

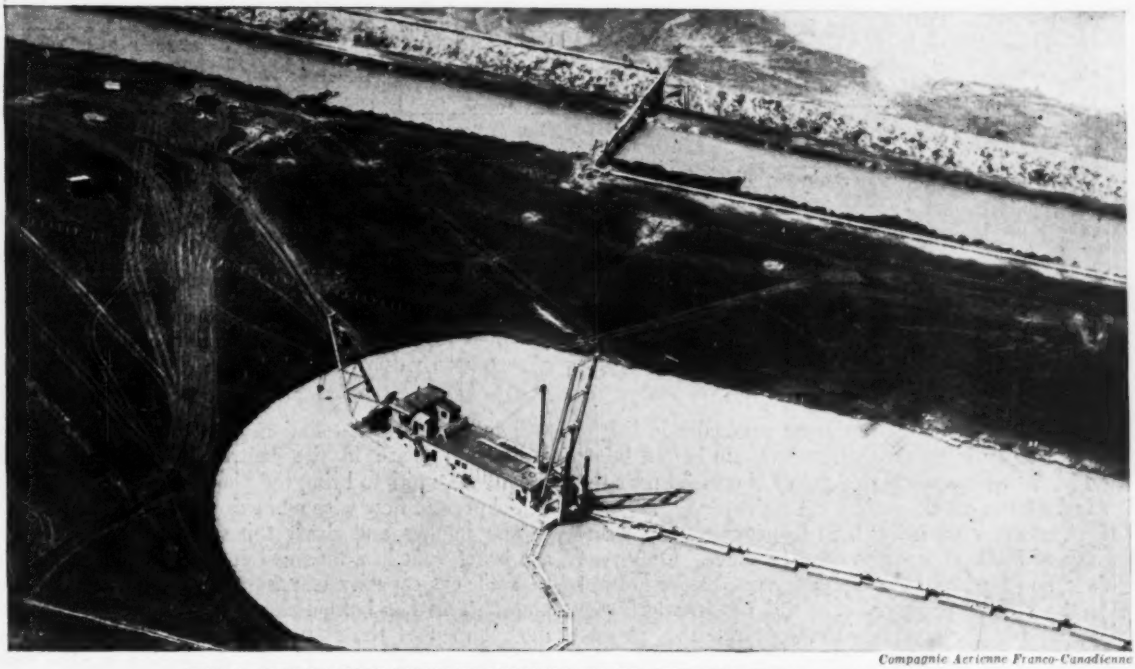

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FIG. 2—HYDRAULIC DREDGE MAKING FIRST CUT FOR THE POWER CANAL

A portion of the north dike with its borrowpit is shown across the upper part of the picture, also the suspension bridge set up to carry the discharge line from the dredge across the borrowpit to the top of the dike. When this picture was taken the dredge was discharging to the south dike. The floats in the center foreground carry the electric power cables to the dredge.

being undertaken. Except for some low glacial hills close to the river, the land between the two lakes is flat, much of it lying slightly below the level of extreme high water in Lake St. Francis. Overflow of the land by high water is now prevented by a dike along the lake shore. The soil is clay, chiefly a stiff marine clay, laid down in the bottom of a prehistoric lake, with some deposits of glacial clay having a high boulder content. The underlying rock is Potsdam sandstone at the east end and limestone at the west end. The sandstone comes to the surface in few places except at the extreme lower end of the canal where the power house is located. There it provides an excellent foundation for the power house but also makes necessary the removal of 1,500,000 cu.yd. for the power house foundation and tailrace.

Because much of the land is below the level of Lake St. Francis, the surface of the power canal will be above the level of the surrounding land for the greater part of its length. The canal will, therefore, be carried between dikes for its entire length. At the upper end these dikes

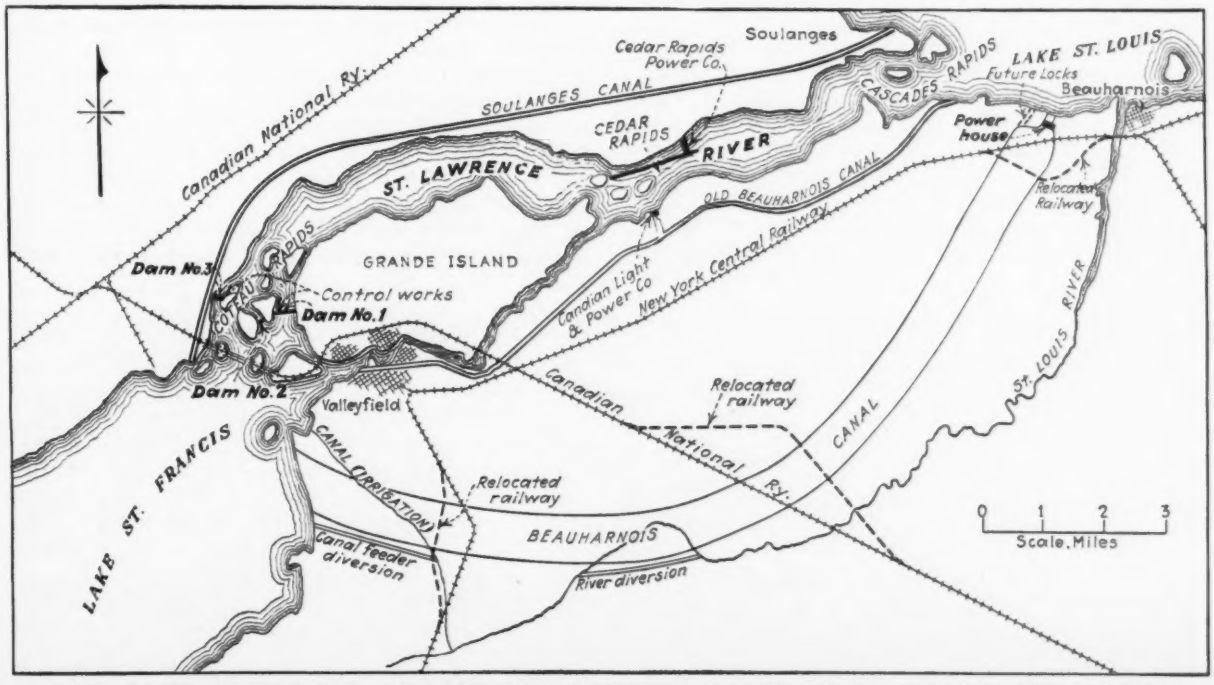


FIG. 3—SOULANGES SECTION OF THE ST. LAWRENCE RIVER SHOWING THE BEAUHARNOIS DEVELOPMENT

The canal is shown at its full width. At the left is shown the location of the control works at the head of Couteau Rapids.

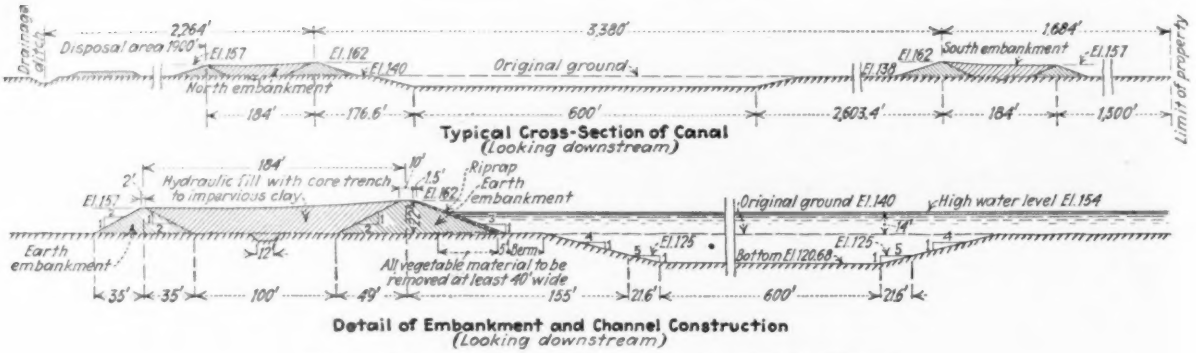


FIG. 4—TYPICAL SECTION OF CANAL AND EMBANKMENTS

are to be low, but they will increase gradually in height until the forebay is reached, the maximum height being about 45 ft., where a small side gulley is crossed near the lower end of the canal.

The canal dikes are being built to provide for a channel width of 3,380 ft. crest to crest of dikes. Only part of this channel width is to be excavated below ground level in the present project, but as a 3,380-ft. width will be required for the complete development, the present undertaking calls for the construction of the dikes in their final location. This can be done without adding materially to the cost of the present work. Also, by constructing the dikes now the cost of future enlargement of the canal will be greatly reduced, because the entire area will be submerged and it will be possible to remove the material remaining in the channel by hydraulic or ladder dredges.

The channel now being dug will have a bottom width of 150 ft. and a depth of 27 ft.; its longitudinal slope will be 1 : 23,000 ft. A cross-sectional area sufficient to keep the velocity of flow below 2.25 ft. per second is called for.

Power Available—The Beauharnois Power Corp. has available for its use in this development a total of 53,000 sec.-ft. of water, 40,000 on permit from the Canadian government and 13,000 sec.-ft. through rights which it has acquired from private companies. As the full head between Lake St. Francis and Lake St. Louis is approximately 83 ft., this quantity of water will be sufficient to produce 400,000 hp. An installation of 216,000 hp. is to be made in the initial development, two units of 50,000 hp. each for the generation of 25-cycle power for sale to the Ontario Hydro-Electric Power Commission and two units of similar size to generate 60-cycle power for local use; two service units of 8,000 hp. each will complete the installation. The power house is being built with space in the central section for six more 50,000-hp. units to bring the plant up to the full capacity of the present flow without having to enlarge the building.

The intakes and draft tubes for these future units are being built in a modified form to provide sluiceways of sufficient capacity to pass the full flow of the power plant. This has been done to provide against upsetting the regimen of the river should it become necessary to shut down the entire plant. A section of the power house showing these sluiceways and a typical generating unit is given in Fig. 7.

River-Control Work—Included in the power company's agreement with the Canadian government is a provision for the construction of control works at the head of Coteau Rapids in the St. Lawrence River to regulate the flow of the river at that point and maintain the level of Lake St. Francis. The location of the control works is shown in Fig. 3 and their details in Fig. 6. They consist of dams across three of the four river channels at the head of the rapids. The dams are made up of a central barrage flanked by dikes of rock and earthfill. A total of 35 gates is provided, the gates being 50 ft. wide and of varying height, depending upon the elevation of their sills. No dam is to be built across the main river channel.

Highways and Railways—Three railways and two main highways are to be maintained across the canal and one highway across the tailrace. The highways and railways across the canal are to be carried on three bridges, and as it is anticipated that the canal will be used for navigation purposes the government has specified that the bridges cross the canal at right angles. Further, the railway companies require that a length of level track

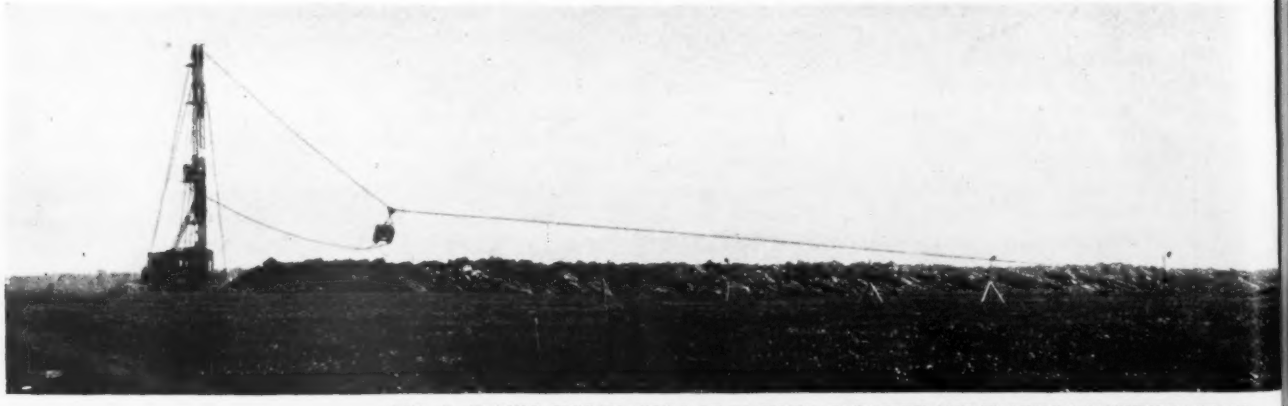


FIG. 5—TOWER EXCAVATORS OF 10-CU.YD. CAPACITY AND HAVING A MAXIMUM SPAN

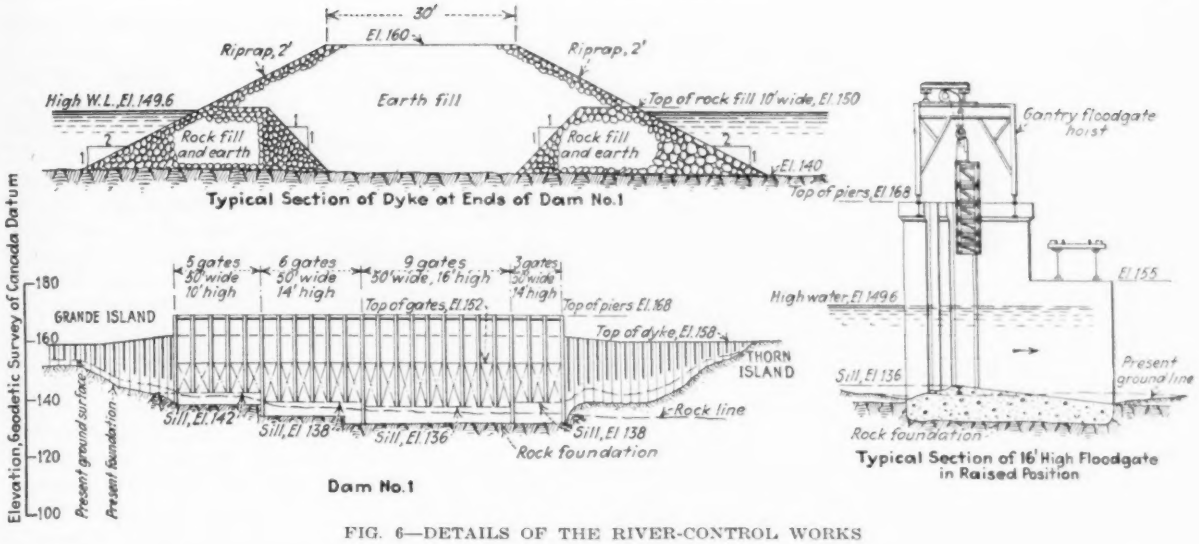


FIG. 6—DETAILS OF THE RIVER-CONTROL WORKS

sufficient for one train be provided on the approaches to each canal bridge to facilitate starting trains stopped by the opening of the lift span across the navigable channel. These two requirements made long approach embankments necessary. The higher ones are being built by train fill from temporary trestles and the low ones by dragline.

Except where they cross the navigable channel, the bridges are to be made up of 100-ft. deck-plate girders supported on narrow concrete piers. Vertical-lift trusses are proposed for the navigable channel crossings, but until the channel is put into service the railroads and highways will be carried across the channel by shorter spans supported on temporary piers. Concrete piers for the lift spans are being built as part of the present undertaking.

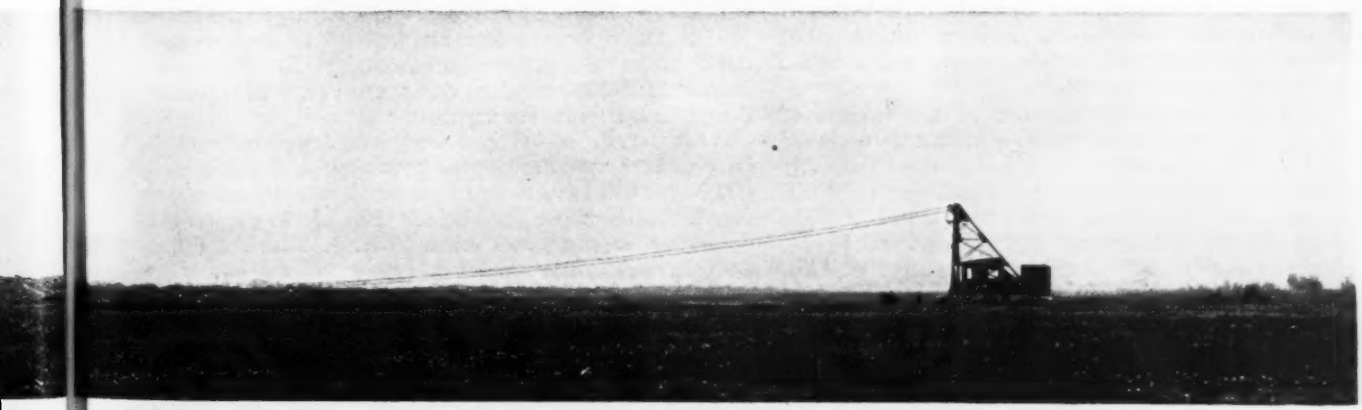
All bridge piers are to be carried down below the maximum anticipated canal depth, where spread footings are to be laid down over an area sufficient to carry not only the normal dead and live loads but also the thrust due to stopping trains for an open draw.

For the two combined highway and railway bridges the highway girders are to be carried on concrete brackets at one side of the piers, the railway girders being centered on the piers on account of their heavier loading.

Canal Construction—The canal dikes are being built in three parts, two outer embankments and a central core of dredged material. Details are shown in Fig. 4. The two embankments are built of surface soil thrown into place by tower excavators or draglines. Surface soil is used because it is of more stable character than the underlying marine clay, and as it is of shallow depth a wide area has to be skimmed in order to obtain sufficient material for the higher embankments. This accounts, in part, for the use of tower excavators of wide span between head and tail towers, as shown in Fig. 5.

The inner embankment lies along the line of the inner or channel side of each dike. The outer or secondary embankments are thrown up back of inner ones at distances varying from 184 to 600 ft., depending on the area needed for the disposal of dredged material. When the two embankments are completed the area between them is filled with the subsurface clay dredged from the canal. A 26-in. hydraulic dredge is used for this latter work. Excess water is run off to ditches which carry it to the natural drainage channel. In some instances the water is run into secondary stilling basins for clarification, as the dredged clay is of a colloidal character which settles at an exceedingly slow rate. Protection of the canal dikes against wash is being obtained by dumping rock and boulders upon their inner slopes.

The navigable channel called for in the government's requirements is to have a minimum depth of 27 ft. over a bottom width of 600 ft. It will follow the line of the north dike. For this reason all dredging is being done at that side of the canal.



OF 900 FT. FROM HEAD TO TAIL TOWER ARE USED IN THE DIKE CONSTRUCTION

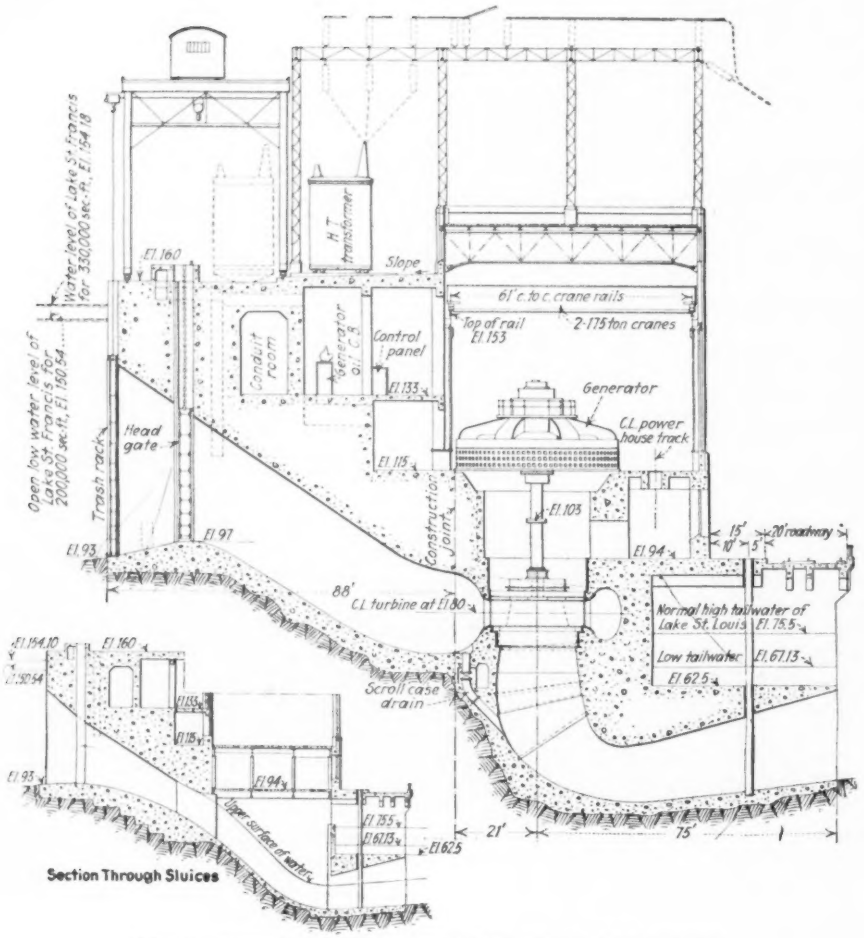


FIG. 7—TYPICAL SECTIONS THROUGH THE POWER HOUSE

Earth Moving—Construction of a canal of the magnitude contemplated at Beauharnois is primarily a problem of moving vast quantities of earth at the lowest possible cost. Capacity and type of earth-moving equipment employed on the job are, therefore, of primary importance.

The earth-moving equipment in use along the canal includes tower excavators, draglines and a hydraulic dredge. The tower excavators are used for building large embankments, and the dragline excavators are employed for the construction of embankments of heights below the economic limits of tower excavators. They are used also for channel excavation through the boulder clay and for auxiliary work, such as the construction of stream-diversion channels and drainage ditches. The hydraulic dredge is used for channel excavation in the marine clay, as noted previously.

Excavating Schedule—Estimates of the amount of earth to be moved by each type of equipment were worked out in advance of construction, and a maximum monthly output was laid down as a guide in purchasing the plant. For tower excavators this output was placed at 500,000 cu.yd., and as the monthly capacity of one having a bucket capacity of 10 cu.yd. was estimated at 125,000 cu.yd. four of that size were purchased. They have a maximum tower span of 900 ft. but work generally at about a 750-ft. span. The head towers are 130 ft. high. They are the largest excavators ever built for any work outside of the Mississippi River levee construction.

To date, all four tower excavators have lived up to their schedules, working two shifts of eleven hours each, six days a week. One machine has exceeded its schedule, having moved 240,000 cu.yd. of earth in July. All are electrically driven, as are the other machines on the work, except the small dragline excavators. The latter are gasoline or diesel-engine driven because of the greater flexibility of the latter types.

There are six small dragline excavators of 1-yd. bucket capacity with a total scheduled output of 135,000 cu.yd. per month. In August they ran their output up to about 180,000 cu.yd.

For heavier dragline work there are two large machines, one of 4-yd. and one of 5-yd. capacity, both scheduled at 75,000 cu.yd. per month. They also are living up to schedule, the smaller being somewhat ahead on account of the better digging which it has encountered.

By far the larger share of earth moving in the canal as ultimately projected is to be by hydraulic dredge, as is a considerable portion of the earth to be moved in the initial development. For that reason a 26-in. suction dredge with a monthly capacity of not less than 400,000 cu.yd. was fixed upon as being the most desirable size when the preliminary estimates were made. Consequently, machinery for such a dredge was purchased late last year and the dredge was built during the winter in a pit dug close to a point where the New York Central Railroad crosses the canal. This spring, after the dredge had been completed, the pit was flooded and the dredge put to work cutting its way up to the upper end of the canal. It is capable of excavating a channel 150 ft. wide and 35 ft. deep.

The dredge has a rated capacity of 1,100 cu.yd. per hour and has reached a maximum monthly output of 817,000 cu.yd. of stiff marine clay. Discharge pipe-line lengths range from a few hundred up to more than 3,000 ft., and the lift averages around 14 ft. Approximately 12,000,000 cu.yd. of clay are to be moved by this dredge in the initial development.

Rock Excavation—Only a small quantity of rock will have to be removed from the power canal, but 1,500,000 cu.yd. will have to be taken out of the tailrace and for the power house foundation. Directly in front of the power house the rock cut is 60 ft. deep for the full 1,000-ft. width of the building.

To save time in clearing the overburden from the power house site and from the section of the tailrace immediately in front of it, the normal method of taking out the rock in a series of cuts was abandoned for one in which the rock is being taken out in one lift. The quantity of rock to be moved and the height at which

it would have to be loaded indicated that an unusually large power shovel would be required. Consequently, an electric shovel of 8-cu.yd. bucket capacity and equipped with a 93-ft. boom was purchased. It is capable of loading 60 ft. above the bottom of the cut it is making.

This shovel was started working in a cut across the front of the power house in order to clear the way for the construction of the draft tubes and the turbine foundations. From this point it will work north excavating the tailrace channel out to the lake. Its monthly output is scheduled at 75,000 cu.yd. an output which it has maintained to date except when used for clearing up a section of the power house foundation which could not economically be cleared by the small 1¾-yd. shovel working in conjunction with it.

Before the work of breaking up the rock at the power house was started, field tests were made to determine the minimum amount of explosive required to lift and break up the first cut across the tailrace channel. Using the results so obtained, 6½-in. well-drill holes were sunk across approximately one-third of the first cut in the tailrace channel and were fired. This shot was so successful and checked so well against the estimates that the remaining two-thirds were similarly loaded and fired. Seventy-seven tons of explosives were used in this second shot.

FIG. 8—DRAGLINE EXCAVATOR WORKING IN BOULDER CLAY
The excavator has a bucket capacity of 4 cu.yd. The cars are standard-gage air dumps of 20-cu.yd. capacity.

Well drills are used for this heavy rock work and jack-hammer drills for the lighter work at the power house. Nine well drills are producing 10,000 lin.ft. per month with eighteen drill shifts per day. No schedule was laid down for the twelve jack-hammer drills, but they have averaged around 14,000 lin.ft. per month with 30 drill shifts per day.

Power-House Construction Plant—Structures of a permanent character not ordinarily found on construction work have been built for the rock-crushing and concrete-mixing plant at the power house. This was done because the plant is designed to meet not only the requirements of the present undertaking, which in itself is of great magnitude, but also to be serviceable for future extensions of the power house and its auxiliaries. Reduction of fire hazard and maintenance costs also was a consideration in determining the type of structure.

The combined rock-crushing plant and concrete-mixing plant is built entirely of steel and concrete, except for the lining of the storage bins and some incidental details in the housing and frame which are of wood. The layout of the rock crushers is unusual in that the primary crusher is located in a pit to which rock may be dumped directly from the yard tracks. The secondary crusher also is below track level, so that in case of emergency the primary crusher may be bypassed by dumping small rock into the secondary crusher. This layout was found to be no more expensive than the more common one of dumping from a trestle to crushers at ground level, yet it presented possibilities for lower operating costs. Also, for winter work the crushers will be protected against extremely low temperatures, as the heat generated in crushing the rock is expected to keep the pits tempered.

Sand rolls are included in the crushing plant. The local rock is a sandstone high in silica, which can be reduced to a sand capable of producing concrete equal in quality to that produced with local natural sand and at a lesser cost for the sand.

The screening plant is located directly over the sand and stone bins in the mixer building. Crushed stone is delivered to it by inclined belt conveyors. When there is a deficiency of sand, a part of the fine screenings is returned to the sand rolls. The crushing plant is designed for a monthly output of 20,000 cu.yd.

Concrete mixing is done in a plant consisting of two 2-cu.yd. mixers, having an estimated monthly output of 25,000 yd. Cement is delivered to the job in carload lots in bulk and is delivered by pumps to the bin in the mixer house or to a cement-storage bin. Concrete is mixed by weight. A water-cement ratio ranging from 1.5 to 0.8 is used, and stone up to a 7-in. commercial size is employed for the mass concrete, but smaller sized stone is used in all reinforced work.

For winter work the present plans call for heating

only the mixing water. As both the sand and stone are crushed continuously, as required, and are not subsequently stored in exposed locations, it is expected that sufficient heat can be given to the concrete through the use of heated water alone. Bottom-dump buckets of 2-yd. capacity are used for delivering concrete to the job. Buckets are dumped directly into the forms.

Oil-burning locomotives are used both for the power house work and for the dump-car trains on the dike construction. Oil consumption per locomotive per day has been cut from 350 to 250 gal. by training the operators never to let their locomotives discharge black smoke and to use their throttle properly. Fuel oil is brought in by boats which come up the river to Beauharnois and unload into a tank at the main camp, which has a capacity sufficient to supply the work during the winter months.

There are 31 miles of standard-gage railroad track on the project. It is laid with second-hand 85-lb. rail and is rock ballasted. These are unusual features for a consruction railway, but they are expected to pay for themselves many times over through the elimination of many accidents and derailments.

The total number of men employed upon the work to date is about 2,000. The main camp is located at the power house site close to the town of Beauharnois, and secondary camps are located along the canal at points convenient to the major operations there. The main camp is equipped with a water-supply and sewage-treatment plant. All water is chlorinated.

The property is owned by the Beauharnois Power Corp., of which R. O. Sweezey is president and R. A. C. Henry vice-president and general manager. The engineering is in charge of the following consulting engineers: F. B. Brown, Montreal; T. H. Hogg, Toronto; W. S. Lee, Charlotte, N. C., and Albert S. Crane of New York City.

The construction work is being done by the Beauharnois Construction Co., a subsidiary of the Beauharnois Power Corp., with F. H. Cothran, vice-president and general manager, in direct charge; D. F. Noyes, general superintendent; M. V. Sauer, hydraulic engineer; B. K. Boulton, electrical engineer; R. G. Watson, mechanical engineer; O. B. Bestor, assistant engineer; J. A. Knight, designing engineer; P. H. Morgan and A. O. Hawes, assistant superintendents.

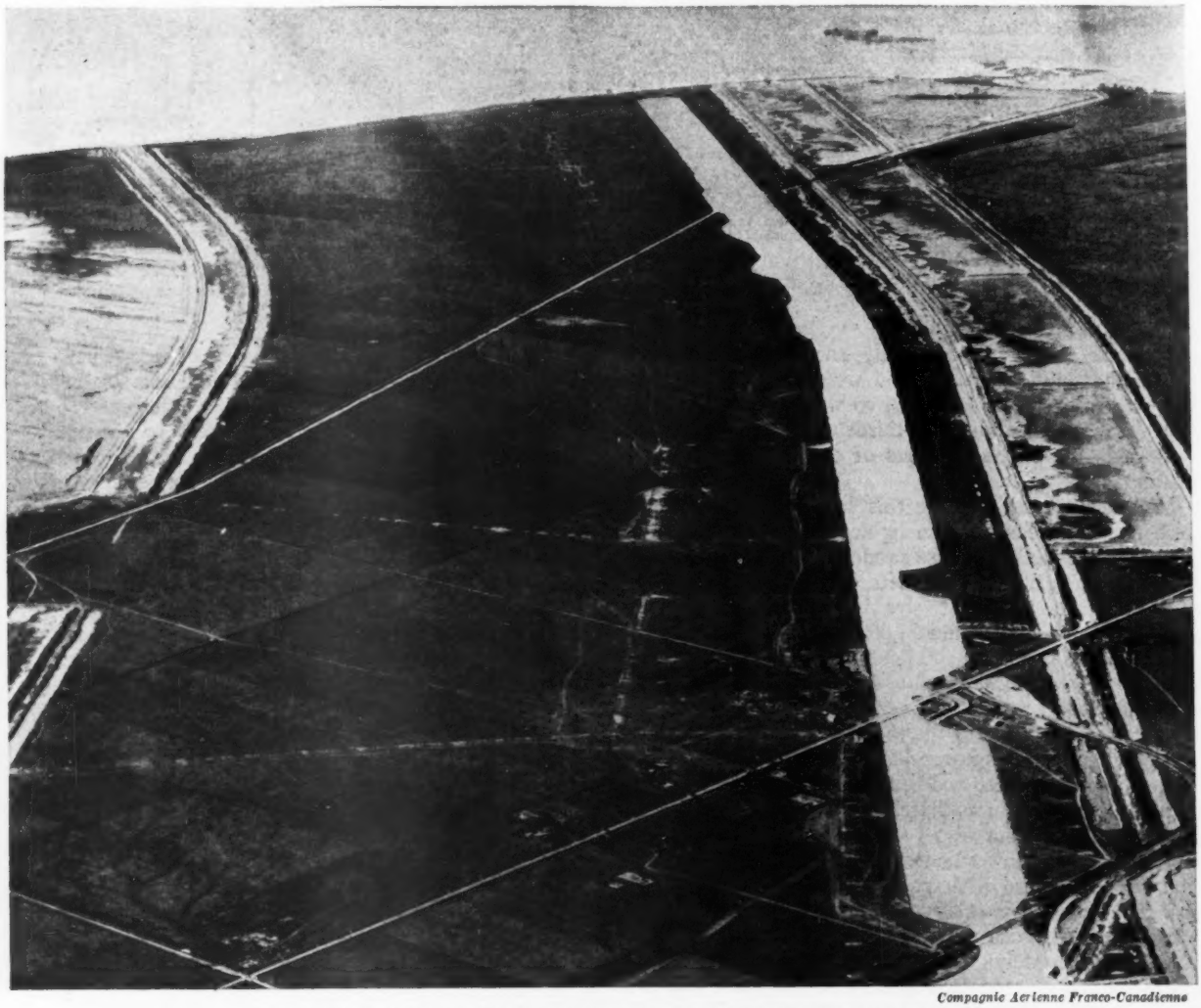


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FIG. 9—AERIAL VIEW OF THE UPPER END OF THE POWER CANAL

The two main dike lines, 3,380 ft. apart, are shown at the sides of the picture. Behind them are the secondary dikes forming basins into which dredged material is pumped. Lake St. Francis appears at the top of the picture. At the left of the center of the picture is the first cut made by the hydraulic dredge from the point where it was assembled (at the railroad crossing in the foreground) to the dike along the shore of the lake.

Design of Circular Tank of Reinforced Concrete

Problems Involved Are Similar to Those Found in the Designing of Arched Masonry Dams

By I. L. Rasmussen

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WHEN designing circular tanks, as well as arch dams, the designer has to overcome theoretical obstacles not generally met with in the design of most other structures, or if there are equally troublesome difficulties, solution of these may generally be found in a fair number of text books published, but as far as the writer's experience goes, this is not so in the case of these structures.

Both circular tanks and arch dams have walls rigidly fixed to the base, which for our purpose may be considered immobile. The radii of the cylindrical sides tend to shorten or lengthen, as the case may be, under the side pressure. At the base, however, they are completely restrained and their radii cannot shorten or lengthen. As distance from the base to any horizontal section of the wall increases, so increase also the unrestrained movement of the walls, until at a certain distance up from the base the radial movement will be entirely unrestrained. To determine this distance and the moments and stresses which are set up between the base and this point through the restraint at the base is the chief problem to be solved when designing circular tanks.

The writer submits a fairly easy method of doing this, and while he claims no great originality in this matter and feels sure that better methods have been worked out by others, they do not seem to be generally available.

Compared with the design of arch dams, that of circular tanks is quite simple. The tank walls are fixed at the base only, whereas those of the arch dam are fixed along the whole height at the abutments in addition to being fixed at the base, and owing to its dimensions, huge as compared with those of the tank, many factors which may be neglected in the case of the latter cannot be neglected with impunity in connection with the design of the former.

At the point from the base where the walls may move under side pressure without being influenced by the restraining moment at the base, the ring reinforcement of the tank will take up the full liquid pressure. Farther down this reinforcement can take only part of the pressure, and this amount is in direct proportion to permitted elongation of the radius.

With a uniform ring stress in the wall, the elongation of the radius may be termed d for unrestrained movement. If under restraint the elongation, which hereafter will be termed deflection, is d_1 and W is the liquid pressure the ring would take up under unrestrained deflection, then under a deflection d_1 it can take up only a side pressure equal to $\frac{Wd_1}{d}$.

Let a tank of the height h be filled to this level with liquid and let the influence of the restraint at the base end at a point a distance of $x = a$ above same (see Fig. 1), with an unrestrained deflection equal to d at this point, and let a point with a distance x from the base, where x is less than a, have a deflection d_1 and $d - d_1 = y$. The horizontal pressure which at this point cannot be taken up by the ring reinforcement is equal to $(h - x)w \times \frac{y}{d}$, w being the weight of 1 cu.ft. of the liquid. The side walls will deflect as shown in Fig. 1, while Fig. 2 shows a diagram for the pressure ratio $\frac{y}{d}$. To introduce this ratio into our calculations will cause very great difficulties as far as our computations are concerned. Therefore an approximation, which the writer considers permissible, has been made, by letting the ratio $\frac{y}{d}$ vary according to Fig. 3, thus permitting an easy calculation of the distance a, etc.

The liquid pressure which at x cannot be taken up by the rings at the wall at that point is then equal to

$$(h-x)\frac{y}{d} = (h-x)d\,\frac{(a-x)}{a} \times \frac{1}{d} = \frac{w}{a}(h-x)(a-x).$$

Assuming first a uniform deflection d, corresponding to constant ring stress and free movement at the base, and considering a strip of wall 1 ft. wide and full height it would require a force A, applied at the bottom of the wall, to pull the wall back to its restrained position as shown in the sketch, Fig. 1. However, as the restraining movement will prevent the wall from assuming, at the point of junction between the wall and the base an angle with the base different from that prevailing when the tank was empty, a moment M_1 has to be introduced at the base to restore this original angle, which we shall assume to be 90 deg. This moment will cause a reaction P at $x = a$. We proceed as follows:

$$A = \frac{w}{a}\int_0^a (h-x)(a-x)\,\frac{1}{a}(a-x)dx$$

$$= \frac{w}{a^2}\int_0^a (h-x)(a-x)^2 dx$$

$$A = \left[-\tfrac{1}{3}(a-x)^3(h-x) + \tfrac{1}{3}\int (a-x)^3(-dx) \right]_0^a \frac{w}{a^2}$$

$A = -\frac{1}{3}wah + 1\frac{1}{2}wa^2$, to be introduced as positive into our calculations.

At a point z from the base this moment is:

$$M = Az - \frac{w}{a}\int_0^z (h-x)\ (a-x)\ (z-x)dx - P\,(a-z)$$

$$M = (\tfrac{1}{3}wah - 1\tfrac{1}{2}wa^2)z - \frac{w}{a}\int_0^z (haz - hzx - azx + zx^2 - hax + hx^2 + ax^2 - x^3)dx - P(a-z).$$

$$M = \tfrac{1}{3}whaz - 1\tfrac{1}{2}wa^2z - \frac{w}{a}\left[hazx - \tfrac{1}{2}hzx^2 - \tfrac{1}{2}azx^2 + \tfrac{1}{3}zx^3 - \tfrac{1}{2}hax^2 + \tfrac{1}{3}hx^3 + \tfrac{1}{3}ax^3 - \tfrac{1}{4}x^4 \right]_0^z - P(a-z)$$

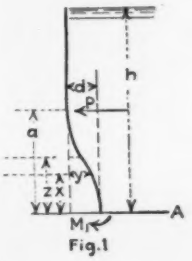


Fig. 1

Fig. 2

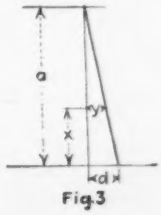


Fig. 3

$$M = \tfrac{1}{3}whaz - \tfrac{1}{12}wa^2z - \frac{w}{a}\left(\tfrac{1}{2}haz^2 - \tfrac{1}{6}hz^3 - \tfrac{1}{6}az^3 + \tfrac{1}{12}z^4\right) - P(a-z)$$

We now make z our variable and put $z = x$. The moment at any point x between $x = a$ and the base is accordingly:

$$M = \tfrac{1}{3}whax - \tfrac{1}{12}wa^2x - \frac{w}{a}\left(\tfrac{1}{2}hax^2 - \tfrac{1}{6}hx^3 - \tfrac{1}{6}ax^3 + \tfrac{1}{12}x^4\right) - P(a-x) = -\frac{d^2y}{dx^2}EI. \quad (1)$$

Thus we have obtained an equation from which can be determined a, P and moments and shear along a.

Integrating this equation, we obtain:

$$-EI\frac{dy}{dx} = \tfrac{1}{6}whax^2 - \tfrac{1}{24}wa^2x^2 - \frac{w}{a}\left(\tfrac{1}{6}hax^3 - \tfrac{1}{24}hx^4 - \tfrac{1}{24}ax^4 + \tfrac{1}{60}ax^5\right) - Pax + \tfrac{1}{2}Px^2 + c_1 \quad (2)$$

$\frac{dy}{dx} = o$ for $x = o$ and $x = a$, therefore

$$c_1 = o = +\tfrac{1}{6}wha^3 - \tfrac{1}{24}wa^4 - \frac{w}{a}\left(\tfrac{1}{6}ha^4 - \tfrac{1}{24}ha^4 - \tfrac{1}{24}a^5 + \tfrac{1}{60}a^5\right) - Pa^2 + \tfrac{1}{2}Pa^2$$

$$\text{or } \tfrac{1}{2}Pa^2 + \tfrac{1}{60}wa^4 - \tfrac{1}{24}wha^3 = 0$$

$$P = \tfrac{1}{12}wha - \tfrac{1}{20}wa^2.$$

Equation 2 reads, with $c_1 = o$:

$$-\frac{dy}{dx}EI = \tfrac{1}{6}whax^2 - \tfrac{1}{24}wa^2x^2 - \frac{w}{a}\left(\tfrac{1}{6}hax^3 - \tfrac{1}{24}hx^4 - \tfrac{1}{24}ax^4 + \tfrac{1}{60}x^5\right) - Pax + \tfrac{1}{2}Px^2$$

Integrating this equation, we obtain:

$$-EIy = \tfrac{1}{18}wahx^3 - \tfrac{1}{72}wa^2x^3 - \frac{w}{a}\left(\tfrac{1}{24}hax^4 - \tfrac{1}{120}hx^5 - \tfrac{1}{120}ax^5 + \tfrac{1}{360}x^6\right) - \tfrac{1}{2}Pax^2 + \tfrac{1}{6}Px^3 + c_2.$$

Deflection $y = max = d$ for $x = a$, is zero for $x = o$. therefore $c_2 = o$

$$-EId = \tfrac{1}{18}wha^4 - \tfrac{1}{72}wa^5 - \tfrac{1}{24}wha^4 + \tfrac{1}{120}wha^4 + \tfrac{1}{120}wa^5 - \tfrac{1}{360}wa^5 - \tfrac{1}{2}Pa^3 + \tfrac{1}{6}Pa^3$$

or introducing the value for P

$$-EId = \tfrac{1}{18}wha^4 - \tfrac{1}{72}wa^5 - \tfrac{1}{24}wha^4 + \tfrac{1}{120}wha^4 + \tfrac{1}{120}wa^5 - \tfrac{1}{360}wa^5 - \tfrac{1}{24}wha^4 + \tfrac{1}{60}wa^5 + \tfrac{1}{72}wha^4 - \tfrac{1}{120}wa^5$$

$$-EId = -\tfrac{1}{180}wha^4 + \tfrac{1}{360}wa^5.$$

In the above equation d is a function of the tank radius and stress of ring reinforcement, E the modulus of elasticity for reinforced concrete, and I is the moment of inertia of the horizontal wall section, 1 ft. wide. Both ring stress and moment of inertia have been assumed as constant for the purpose of the computation. Should they vary, this will have to be provided for in the calculations.

This final equation may be solved very easily. d is a function of the radius and the ring stress, I being generally fixed by considering the general requirements in connection with the tank, such as minimum thickness of wall required for watertightness under maximum head of water, etc., and an estimated value thus arrived at is introduced into this equation.

These two constants thus being fixed, and knowing the value of E, a can be determined through the introduction of trial values for the same. It will, however, be more advantageous to solve the equation graphically, as the graphic solution (see diagram) will at a glance, so to speak, give information regarding the greatest value for EId for varying heights of tanks, or for a fixed height and varying EId, the maximum value of a can be seen, etc., according to the way the diagram has been worked out.

By introducing the values for a and P into equation (I), the bending moments at any point along a may be determined, together with the shear, the maximum of which is $A + P$.

Such a diagram is given, with values for $a = 7$ ft., $a = 8$ ft., $a = 9$ ft., $a = 10$ ft. and $a = 11$ ft., with corresponding values for EId:

$a = 7$,	$EId = f(a)$	$= 18{,}705$
$a = 8$,	$f(a)$	$= 21{,}846$
$a = 9$,	$f(a)$	$= 33{,}898$
$a = 10$,	$f(a)$	$= 50{,}000$
$a = 11$,	$f(a)$	$= 70{,}760$

We will now assume a reinforced-concrete tank 30 ft. in diameter and with a height $h = 20$ ft., filled with water to a height h equal to the maximum of 20 ft. and with a uniform thickness of walls of 8 in. and the of ring reinforcement stressed uniformly to 12,000 lb. per square inch from the base to a point well above $x = a$, under assumption of no restraint at base.

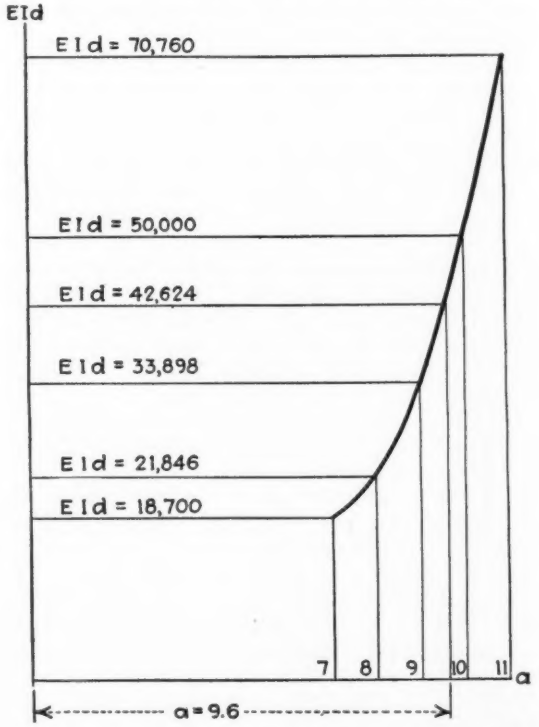


FIG. 4—DIAGRAM FOR $-EId = -\tfrac{1}{180}wha^4 + \tfrac{1}{360}wa^5$

We assume: E for steel $= 30{,}000{,}000$; E for reinforced concrete $= 2{,}000{,}000$; $I = \frac{1}{12} \times 12 \times 8^3$. $= 512$ inch^4

As d is measured in inches but a in feet, we must divide EId by 12^3

$$EId = E_{conc.} \times I \frac{12{,}000}{E_{steel}} \times 15 \text{ ft.} \times 12 \text{ in.} \times \tfrac{1}{12^3}$$

$$= 2{,}000{,}000 \times 512 \times \frac{12{,}000}{30{,}000{,}000} \times 15 \times 12 \times \frac{1}{1{,}728}$$

$EId = 42{,}624$.

On our diagram we find that a value of EId equals 42,624, which corresponds to a value of a of approxi-

mately 9.6 in. By introducing $a = 9.6$ in. into equation (I), the bending moments can be computed.

The greatest negative moment (minimum moment) is obtained for $x = o$, while in order to find the greatest positive moment (maximum moment), equation (I) must be differentiated and the value of x which will make $\frac{dM}{dx} = o$ must be found. The resulting equation of the third degree may be solved by means of the standard formula or graphically. The horizontal reaction at $x = a = \frac{w}{a}\int_o^a (h-x)\ (a-x)\frac{x}{a}dx - P$ and must be taken up by additional ring reinforcement at that height, which must be stressed to 12,000 lb. per square inch. The shear at the base is $A + P$, as already mentioned.

In order to find the point of inflexion, the values for x, which will make equation (I) equal to o, must be computed. The reinforcement for the positive moment should extend from well below the point of inflexion to well above $x = a$, on the outside face of the tank, while the reinforcement for the negative moment should extend from well above the point of inflexion into the base, where it should be bent. The base must receive corresponding reinforcement.

The writer thinks it hardly necessary to make computations for partly filled tanks. This can, however, easily be done, but it must be remembered that in this case reinforcement will be unequally stressed the whole way up, and that also $\frac{dy}{dx}$ (equation 2) will be zero for $x = o$ but not for $x = a$. Where the sides are sloping, $\frac{dy}{dx}$ is different from o both for $x = a$ and for $x = o$. Further it should be remembered, although it is clear from the computations, that the ring reinforcement below $x = a$ must not be reduced in spite of its lowered stress.

WELDING APPLIED TO TWO BUILDINGS

Because welding is new to most steel fabricators and erectors, it will be necessary for some time for the engineer to supplement his bid invitations with special requirements and drawings and to surround the actual fabrication and erection with safeguards in the form of qualification tests and careful inspection. In the first of the two articles which follow, a description is given of the largest all-welded building yet built in this country. The structure is notable for the useful welding details developed for its construction and for the thorough inspection of all welded work. The second article is indicative of the best practice in specification writing and operator control.—Editor.

Useful Structural Detail Developed for Large All-Welded Building

By J. G. Ritter

Welding Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

THIS SUMMER the Westinghouse Electric & Mfg. Co. erected its 24th welded building since the 790-ton factory building at Sharon, Pa., was completed in 1926. The latest building, involving 2,000 tons of steel, is the largest all-welded structure built to date and represents the extent of the progress which has been made in this type of construction. It will be used to house 25 engineering laboratories and is designed to withstand heavy loads and shocks imposed by various testing apparatus. Virtually every branch of electrical research work will be carried out in these laboratories. Apparatus will be tested ranging in size from electric locomotives to radio vacuum tubes. It is of interest to note that one of the laboratories will be devoted to developing welding methods and processes. The upper six floors will be used for offices and drafting rooms.

FIG. 1—WELDING A COLUMN SPLICE

Plates between column flanges are shop welded. Splice plate is shipped loose and held in position by ¾-in. diameter bolts until the ⅜-in. field welds are made.

The Central Engineering Laboratory, as the building is to be called, is eleven stories or 191 ft. high, 220 ft. long, and 120 ft. wide. More than 10 miles of welding was used, requiring 16 tons of welding wire. All electrodes were grade No. 18 for structural work. Fifteen welders were employed for the field erection work. Three per cent of the amount of steel required for a riveted design was saved through the use of arc welding.

The use of welding on the building started with the foundation piling, which was of the Westinghouse "Hollowspun" type, a centrifugally cast reinforced-concrete pile with welded reinforcing cages.

Design Features — Wide-flanged beams were used for column and floor members, the parallel flanges being well adapted to welded designs. The joints were designed with the object of minimizing the use of overhead welding. A maximum unit stress of 11,300 lb. per square inch

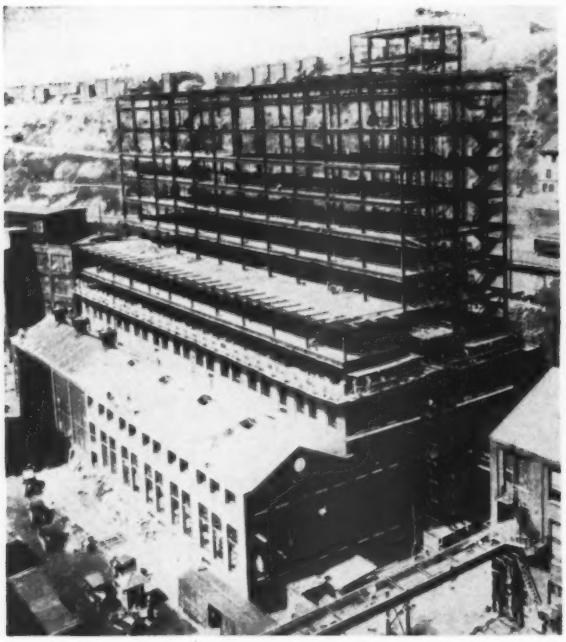


FIG. 2—CENTRAL ENGINEERING LABORATORY, WESTINGHOUSE PLANT

was used in the welds. Field erection was done with the aid of erection bolts, which were located as shown on some of the accompanying details. Seat angles and other details were welded in place in the shop. The inserted seat angle shown in Fig. 3 makes a very effective girder connection and permits a large tolerance in the length of the beams. The girder-to-column flange connection shown in this same illustration was designed from the results of some special tests. These tests indicated that a plate approximately the thickness of the web should be used on each side of the girder web, that the width of the plate should be about six times the thickness and the length not more than half the girder height, and that the sum of the minimum sections of the two webs should be about 25 per cent greater than the web thickness. This construction insured a mimimum amount of stress concentration in the welds due to the beam deflection, and distributed the stress over a considerable area of the web material.

No erection bolts were used in the field fabrication of the floorbeam-girder connections. The wedges shown held the beams rigidly in place until the field welding was completed. In some of the connections plates resting on the girder flanges were used instead of seat angles for the beams.

The type of column splice used permits easy shop and field fabrication. The splice plate is not fastened direct to the column flange, as is customary, but is fastened to a plate inserted between the flanges as is shown in Figs. 1 and 3. Holes are put into the inserted plate before it is welded into the column, thus eliminating the handling of the large beams for drilling or punching. Slight variations in the beam dimensions do not materially affect this type of joint and it is well adapted to joining beams of different sizes as is shown in the illustration, Fig. 3.

Inspection—Very thorough inspection was maintained throughout the entire shop and field welding of this structure. All welders were required to make acceptable specimens for tension and bend testing. The latter con-

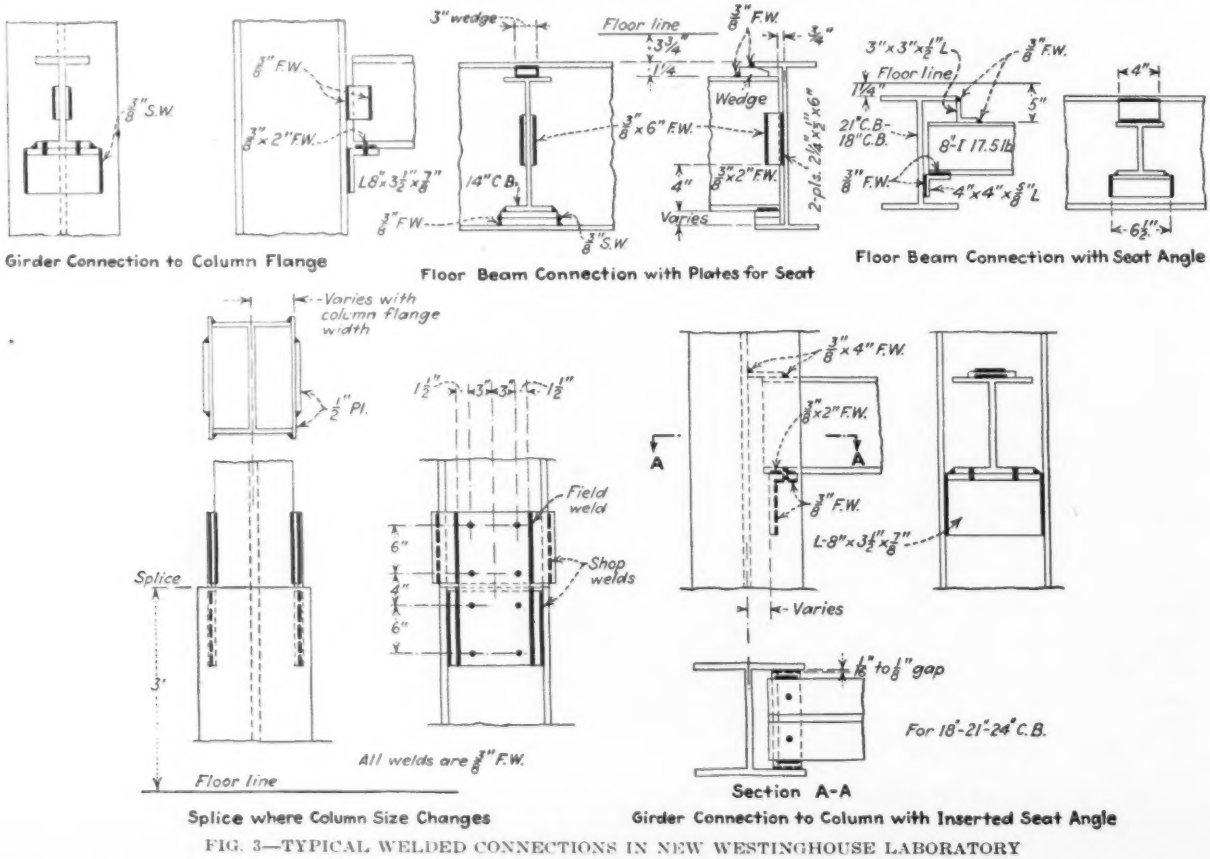


FIG. 3—TYPICAL WELDED CONNECTIONS IN NEW WESTINGHOUSE LABORATORY

sisted of two 3x6x¾-in. bars joined at right angles to one another by a ¾-in. weld bead on one side only. These tee welds were made in both the horizontal and the vertical position, and the welds were fractured to determine the area of fusion and general appearance. The tensile specimen (two 2x6¾-in. bars joined by ½-in. splice plates top and bottom) was broken in a testing machine and a strength of at least 45,000 lb. per square inch was required of the ½-in. fillet welds.

Each joint in the building, when completed, was marked or "signed" by the welder. This mark consisted of a simple pattern, such as three dots, formed on the beam adjacent to the weld with the welding electrode. Individual marking of welded joints has been in practice in the Westinghouse shops for some time and is a very effective method of insuring high quality welding. There is no chance of evading the responsibility of poor workmanship. After each joint in the building was approved a distinctive mark was applied to it by the welding inspector.

The lack of noise and confusion in the construction of this building was remarkable. Although the building was constructed within a few feet of engineering headquarters, the hundreds of occupants were hardly aware that structural steel was being raised and put into place.

The building was designed by Bernard H. Prack, Pittsburgh industrial architect, with the co-operation of Westinghouse engineers. The Mellon-Stuart Co. had the general contract, and the steelwork was supplied by the American Bridge Co. The field welding was done by the Leake & Nelson Co., of Bridgeport, Conn. The entire project was conceived by W. S. Rugg, vice-president of the Westinghouse Electric & Mfg. Co.

Contract and Work Procedure on a 14-Story Field-Welded Building

By William F. Carson and Frank P. McKibben
Carson & Carson, Engineers, Philadelphia, Pa., *Consulting Engineer, Black Gap, Pa.*

LOCATED in the heart of Wilmington, Del., the sixth section of the DuPont office building completes a structure which covers an entire block. To minimize the noise usually connected with the construction of buildings, arc welding was adopted for the more important field connections of the steel frame. Minor connections were bolted. The new addition, together with an interior court approximately 141x51 ft., covers a plot 184x95 ft. in plan. It contains a basement, fourteen office floors, a pipe loft and penthouse. The height from the ground floor to the penthouse roof is 194 ft. 4 in.

Structural design followed usual practice with the exception that no wind stresses were included, each floor-slab being considered as a horizontal beam carrying the wind to sections 1 and 5 of the existing building. With the exception of special loads, the loads used, in pounds per square foot, are shown in Table I.

TABLE I—LOADS USED IN NEW DUPONT BUILDING, POUNDS PER SQUARE FOOT

	Beams and Girders			Columns		
	Live Load	Dead Load	Total	Live Load	Dead Load	Total
Roof	40	75	115	40	100	140
Floors	75	75	150	75	110	185
Corridors	125	75	200	...	...	...
Ground floor	125	75	200	125	110	235
Sidewalks	300	75	375	300	100	400

Corridor partitions were included at 450 lb. per linear foot.

The specifications for the steel frame covered combined shop-riveted and field-welded construction only. Below are several paragraphs from these specifications:

In general, the shop work will be in accordance with standard riveted practice, except as shown in typical details and as required for field welding. Rough or unfinished bolts are to be used for erection and as permanent connections for beams to girders and beams to beams to within 3 ft. of the columns. At the columns and within 3 ft. thereof bolts and arc welding are to be used, or bolts, seats and arc welding. Special cases of heavy reactions may require rough bolts for erection and arc welding to take the load.

All field equipment is to be electrically driven. Current of three phase, 60 cycle, 220 volts is to be obtained from the local electric company and paid for by the steel contractor. Separate meters are to be provided for the arc-welding machines.

Erection is to be done in the best approved manner and the steel is to be bolted and plumbed before arc welding is started. In case of necessity the arc welding may be required to be done in the vicinity of the erection equipment before proceeding with the rest of the work.

Connections to old work will be done by arc welding and bolting, in accordance with drawings prepared by the steel contractor and approved by the owners and engineers.

The detailed specifications for field welding were taken from "Major Provisions of an Arc-Welding Specification," by Frank P. McKibben, *Engineering News-Record*, March 14, 1929, p. 425.

The structural plans and column schedule were com-

FIG. 1—FIELD-WELDED ADDITION TO DUPONT BUILDING, WILMINGTON, DEL.

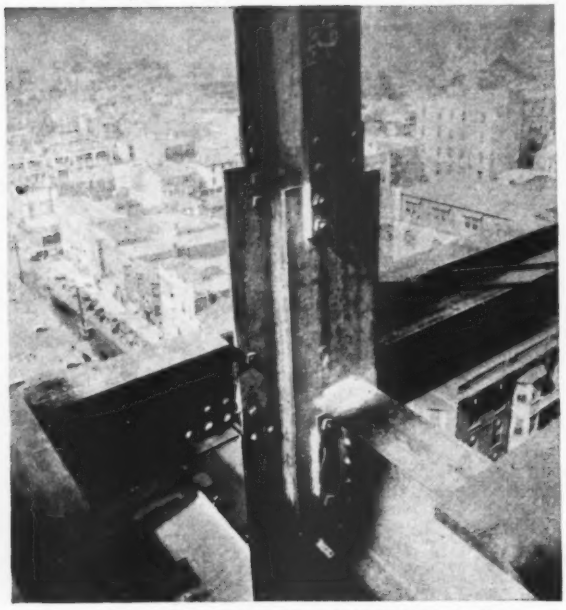


FIG. 2—FIELD-WELDED CONNECTION AT SEVENTH FLOOR

pleted in the manner usually employed for riveted steel frames, but to place all steel contractors on an equal basis for the shop-riveted and field-welded frame, supplemental sketches were made by the consulting engineers, showing various types of connections. Eight sheets were required to illustrate typical column splices and other connections, such as beams to columns, girders to columns, beams to beams, beams to giders, spandrels to columns and a few special cases requiring individual treatment. Four bids were received on the steel frame of the building.

The qualifying of welders, in order to establish their fitness for welding on a structure of this magnitude and importance, is essential and should be done in advance of actual starting of steel welding. For this job three types of specimens were used to determine the welder's competency—lap welded, butt welded and fillet welded connections.

Each welder was first required to make two lap-welded specimens (each consisting of two 6x½x8-in. plates joined with a single ½-in. fillet weld), one specimen welded horizontally and the other vertically. After cooling, each specimen was torn apart with wedges and the fracture examined for brightness, texture and density of weld metal, fusion and penetration into the right-angle corner of the fillet. As this is the simplest test to make, it was also used from time to time in the field as a check on the welder's work.

TABLE II—FIELD-WELDING DATA—DUPONT BUILDING

Electrodes used ($\frac{5}{32}$-in. and $\frac{1}{4}$-in.), lb.	3,220
Amount of electrode or welding wire melted, lb. (estimated 70%)	2,254
Electric current consumed, kw.-hr.	8,395
Electrode melted per kw.-hr., lb.	0.27
Total length of ½-in. fillet, in.	65,400
Welding per kw.-hr., in.	7.8
Weld per pound electrode bought, in.	20.3
Weld per pound electrode melted, in.	29.0
Steel, including intermediate bolted beams, tons	1,576
Length of weld per ton of steel, in.	41½
Welding time (actual welders' time), hours	1,411
Average length of weld per man per hour, in.	46.4
Average length of weld per man per 8-hour day, ft.	30½
Erection started	June 2, 1930
Welding started	June 6, 1930
Erection completed	Aug. 5, 1930
Welding finished	Aug. 7, 1930

Each welder was also required to make at least two butt-welded specimens (consisting of two 9x½x12-in. plates joined by a double-vee weld), one specimen welded horizontally and the other vertically. The specification allowance for tension on welds was 13,000 lb. per square inch, which in comparison with the average of 52,663 lb. per square inch recorded for the seven welders qualifying in the tests resulted in a factor of safety of approximately 4.05.

Finally, each welder was required to make at least two fillet-welded specimens, one welded horizontally and the other vertically. These specimens, consisting of two 4x1x12-in. plates joined by 3x¾x6½-in. cover plates top and bottom, utilizing ⅜-in. fillet welds, were also tested in tension on the basis of a permissible working stress of 3,000 lb. per linear inch. The average of 13,007 lb. per linear inch obtained on the specimens made by the seven welders showed a factor of safety for these connections of 4.34.

In the field all welds were inspected by a trained welder under the direct supervision of the writers. Daily

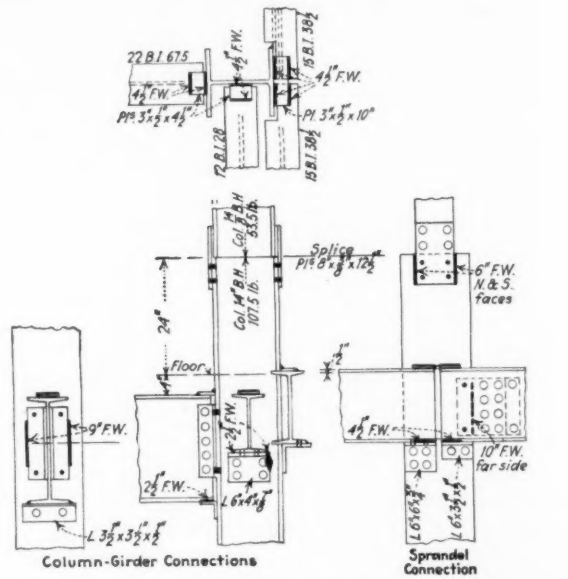


FIG. 3—TYPICAL FIELD-WELDED CONNECTION, DUPONT BUILDING, WILMINGTON, DEL.

welding reports to the number of 50 were made by the inspector. During the progress of the work a minimum of one and a maximum of five welders with one foreman were employed. Typical details of joints most commonly used in this structure are illustrated in Figs. 2 and 3. Erection started June 2, 1930, and was completed Aug. 5, 1930. Welding was begun June 6, 1930, and completed Aug. 7, 1930.

The successful completion of this field-welded steel frame was due to the cooperation of the following: the engineering and construction departments of E. I. du Pont de Nemours & Co.; the architects, Raymond Hood, Godley & Fouilhoux, New York City; the Bethlehem Steel Co. on details of fabrication and erection; and Mellon, Taylor, Hendrickson, Inc., of Philadelphia, subcontractors for field welding.

Frank P. McKibben, Black Gap, Pa., acted as consultant, and approval of details and supervision of welding was handled by Carson & Carson, engineers, Philadelphia.

Roads Here and Abroad

Views of French and Italian Experts Prepared for "Engineering News-Record" After a Two Weeks' Tour Over American Roads Following the Sessions of the Sixth International Road Congress at Washington

Roads From the French Viewpoint

By EDMOND LORIEUX
Inspecteur Général des Ponts et Chaussées, Paris, France

THE engineers of the French delegation to the Sixth International Road Congress, held in Washington Oct. 6-12 and followed by three tours in different sections of the United States, take home very vivid impressions of their stay and their travels in America. First of all, they have to express their sincere thanks to their American colleagues for the courtesies shown them. As a result of the kindness and untiring efforts displayed in supplying them with the most detailed information on research processes, laboratory studies and working methods the French engineers take with them from America information of the greatest value for the advancement of road-building technique.

American Progress in Ten Years

Speaking generally, the French delegates were struck by the work accomplished by the public officials and engineers of the United States in a period of ten years. In this short time they have built a wonderful system of roads in the country and in the cities. Following carefully worked out plans, they have steadily and progressively completed programs drawn up largely with a view to the needs of the future. In carrying out their programs the city street departments do not hesitate, when necessary, to undertake gigantic tasks, such as filling in a large area of Lake Michigan for the creation of avenues, embankments and parks in the magnificent city of Chicago.

American engineers are to be congratulated for having built straight roads which enable the traveler to see ahead for long distances and which simplify the traffic problems in the cities. The authorities are giving special attention to widening the roadways built in the open country. In fact, the 18-ft. road appears to be a little narrow. It is intended for two-way traffic but does not leave enough space between two wide vehicles traveling at fair speed. The 20-ft. type, which today is general in Europe and which seems to be adopted here now, is quite satisfactory in the open country; the 30-ft. road greatly facilitates traffic. As to the 40-ft. road, it is perfectly suited to the approaches to large cities.

Trees are seldom planted along the edges of the roads in America outside of the towns. The engineers who appreciate so highly the many French roads planted with fine trees have learned with pleasure that their American colleagues are taking up this question.

From their long trips on the American roads the French engineers bring back the impression that the cement concrete wearing surface is the roadway best suited for a rapid and medium heavy traffic, at least if, as is the case in the United States, the heaviest vehicles are all equipped with pneumatic tires. There is good reason, then, for the fact that this pavement is rapidly replacing the gravel road: it has the double advantage of promoting the development of traffic and of reducing to a minimum the future labor and expense of keeping the road in condition. With regard to the actual construction of the cement concrete wearing surface, the researches made systematically with a view to still better technical methods and the variety of devices adopted to prevent cracking reflect the greatest honor on the highway departments and the laboratories.

Wearing Surface and Steel Tires

Wearing courses utilizing bituminous products have been successfully employed also, especially in the Northeastern states, through which the French delegation had the opportunity of passing. Worthy of particular notice was the use of cut-back asphalts on gravel roads, kept in condition by means of graders. In France, the old roads of broken stone, well compacted, supply a firm foundation which has made possible the economical construction of good roads suitable for motor traffic by simply applying a top cover of small materials mixed with tar or asphalt products.

In America the problem presented is far different from that in France, because in the United States the traffic consists only of light automobiles and a small proportion of motor trucks, all equipped with pneumatic tires, while in the country districts of France there still exists a large traffic of animal-drawn vehicles fitted with iron tires, which change completely the conditions to which the wearing course of the road is subjected.

Southern Roads Create Interest

The French engineers who are in charge of the construction of roads in the colonies and in the countries under French protectorate, found, in the Southern states, and particularly in Florida, characteristics in general comparable with those in Morocco, Algeria and Tunis. They were greatly impressed by the satisfactory results obtained in America by the use of local materials, even of medium quality (sand, clay, lime rock, top soil) protected by a thin bituminous wearing course.

In the almost desert sections of the country, where it is difficult to maintain numerous gangs of workmen, the well-nigh exclusive use of special machines for making the roadbed, clearing the ditches and forming the slopes attracted particular attention. Thanks to the invention of these efficient processes, there has rapidly been built in the United States a road system which has greatly promoted the development of economic activity and touring. The public authorities have realized that the savings effected in the consumption of gasoline and in the upkeep of automobiles as a result of good roads justify the heavy burdens placed on the taxpayers. This is an example which many countries can follow to their advantage.

The French delegation found that the users of the road submit to a real discipline, which contributes in particular to limit the number of accidents that would not fail to be caused by the very numerous, unprotected level crossings. But, as is the case in France, the American authorities are engaged in gradually eliminating these crossings and there are now some states in which this happy transformation has been practically completed.

Traffic at night seems to be carried on without trouble. However, it might be further facilitated if the headlights of automobiles were made less glaring when passing other cars. It is to be noted also that the risks of accident are greatly lessened by the almost complete absence of cyclists and pedestrians on the roads outside of the cities—a condition which is quite different from that existing in Europe.

In summary, the way in which the road problem has been solved in the United States is impressive for the boldness and wide vision shown in the conception of the programs and for the rapid and remarkable execution of the work.

Road Problems in Italy

By PROF. F. VEZZANI
Department of Communications, Rome, Italy

A VISIT to the United States, useful to every engineer, is of fundamental importance to the highway engineer. The engineers of the Italian delegation consider it great fortune to have been able to attend the Sixth International Road Congress at Washington and especially to have examined so many miles of American highway in the two weeks' trip arranged by the Highway Education Board after the congress. The things that have been of most interest for us were, *first*, the great extent and elaborate character of concrete highway construction, and *second*, the highway experiment station of the Bureau of Public Roads at Arlington.

Italy is making now a great effort to improve her roads, and the national government created, two years ago, a special state highway board which is taking care of the main highway system, including about 13,500 miles. The other roads are under the control of the "provincie" (counties) and of the "communi" (townships) with a total of about 80,000 miles, 26,000 of the "provincie" and 54,000 of the "communi." Beginning on Jan. 1, 1931, all these roads will be put under the control of the "provincie," which are more fit to take care of these roads, having a better and more efficient organization.

Economy Necessary in Road Work

The average system adopted by our state highway board for improving our highways is rather economical and consists of repairing the old macadam and adding a superficial asphalt treatment by cold emulsions. Some of our highways of heavy traffic, however, require pavements of superior quality, and for these we have under experiment at the present time different kinds of hard-surface pavements.

In Italy we follow with great interest the progress of the United States in constructing concrete highways, because, as Italy lacks asphalt oils and natural bitumen, bituminous pavements are very expensive. But it is not possible to adopt in Italy the system of concrete pavements adopted in this country, because on all of our highways there are still in operation a great number of horse-drawn vehicles fitted with metal tires, which produce heavy wear of concrete pavement. This wearing action is unknown to American highways.

We must, therefore, build up concrete pavements able to stand, at least for some years, the destructive action of the metal tires. We try to solve this great problem by employing concrete very rich in cement, and especially by using hard concrete very strongly compacted.

Wear on Concrete Experimental Road

For determining the most practical and economical solution of pavement problems our state highway board, together with the Highway Experimental Institute of Milan, has started a systematic experiment. On the road from Milan to Pavia, near Binasco, over a total length of about 2 miles, have been laid more than a hundred different sections of pavement, each 15 ft. long. The road has been subjected to the passing of many very heavy vehicles with metal tires (loads range to more than 3 tons per wheel), and the wear and tear of the concrete surface has been carefully measured. The experiment is still going on, but we can say now that the area of cross-section of concrete worn away by the metal tires is about 1 sq.in. for 20,000 to 40,000 tons of vehicles passing over the road. This figure (now printed for the first time in any technical journal), compared with the metal-tire vehicle traffic which is passing over a road, can show if it is possible to adopt for this road a concrete pavement.

Experimental study of road problems thus receives much attention in Italy. Our financial means are far below those of the Bureau of Public Roads experiment station at Arlington, which may be considered as the model and as a school for the highway engineers of all the world. The Italian highway delegates remember with respect the founder of this Arlington station, Logan Waller Page, and admire no less the great development of the experiment station which has been accomplished by Thomas H. MacDonald, present chief of the Bureau of Public Roads, whom highway engineers all over the world recognize today as their teacher and their guide.

Highway Congress Tour in Wisconsin

Delegates to the International Road Congress, following the formal sessions in Washington, took part in a number of tours of inspection about the country. One trip took the delegates from Chicago by special train to Milwaukee, where the many manufacturers of road equipment located in and around Milwaukee had arranged a special exhibit on the lake front. From Milwaukee the party was taken to Madison, escorted by the state highway commission, over a route which traversed roads of almost every type found in the state. For the trip each delegate was given a map together with an explanation, printed in so far as possible in his own language, of the various types of road seen on the trip. The route mileage was indicated upon the map so that the exact location of the party could be determined by reference to the speedometer of the bus. This made the delegates, especially those who did not speak English fluently, independent of the party guides and added greatly to the practical value and enjoyment of the tours.

Western State Engineers Discuss Problems of Their Region

Consider Ownership and Conservation of Water, Stability of Irrigation Paper, Limits of Federal Activity and Flood-Control Policy

Special Correspondence

CONSIDERATION of water and land problems of peculiar concern to seventeen Western states is the purpose of the Association of State Engineers, which held a third annual conference in Denver, Nov. 13, 14 and 15. These problems include public water supplies, their conservation and utilization, reclamation of arid lands, stabilization of conditions relating thereto, interstate river controversies, public land policies, flood control and federal departmental policies affecting the interests of the Western states. The resolutions passed by the association were noted in *Engineering News-Record*, Nov. 20, p. 826. The following notes are taken from papers presented at the Denver meeting.

"Ownership of Return Flow Water," a paper by R. J. Meeker, with F. K. Nelson, Myron Swendson and R. H. Willis collaborating, concluded and summarized a discussion on the subject for the last three years. The following are the facts and principles adduced:

1. Return flow is an important item in the irrigated regions of the arid West. Ordinarily, 50 per cent of canal diversions return to the stream. Diversion from a stream system may amount to 175 per cent of the original water supply.
2. Based upon the principle of public ownership of water supplies and the principle that beneficial use is the basis, the measure and the limit of the right to use water, return flow waters belong to the public water supply. This principle has been established in most of the Western states by state constitutional provisions, legislative acts and court decisions.
3. Dual ownership and control, which principle is being advanced for monetary reasons by some cities, drainage districts and federal bureaus, would make absolutely meaningless the term "beneficial use." It would render indeterminate all stream diversions in so far as beneficial use would be indeterminate.

Certification of Reclamation Securities

The matter of certification of reclamation securities by some state agency such as a board or commission was discussed at some length. The opinion was expressed by the representatives of those states where the statute provides for such procedure that unfair advantage of such certification was taken by unscrupulous bond salesmen. It was the opinion of these representatives that investigation by the state of a proposed project should extend only to determining if the district is legally organized, and that the determination of the feasibility of the project should rest with the purchaser of the security. In other words, "Let the buyer beware." Many expressed the opinion that irrigation and drainage district laws should be such that a bondholder upon default could foreclose on the land and acquire title in a reasonable length of time.

"Flood Control and Stream Control," a subject discussed by George S. Knapp, R. T. Cochran, Harold Conkling, T. C. Harhill, John A. Norris and W. H. Yeo, elicited much interest due to the fact that some of the states in the association are in need of flood control while the others look askance at various proposals to construct reservoirs on tributaries of major stream systems for the purpose of flood control which may encroach upon the state control of the waters of those tributaries.

George M. Bacon, with George X. Carter, Harold Conkling and T. F. James collaborating, discussed the recent report of the committee of the American Society of Civil Engineers and suggested that further attempted encroachment upon state control of its resources by federal bureaus should be discouraged. For the association's consideration the following program was offered as governing and controlling limits to federal reclamation: (1) The construction of new irrigation projects shall not be authorized except after thorough investigation and favorable recommendation by the staff of the U. S. Bureau of Reclamation; such investigation to include, in addition to the usual engineering data, an economic survey of the project dealing particularly with the market situation as the basis from which surety of repayment can be deduced. (2) Repayment of construction costs shall commence with the delivery of water to the settlers and be sufficiently elastic to meet the settlers' ability to pay, always conditioned on full repayment in the end. (3) Relinquishment of control of completed works shall be effected to suitable organized agencies as soon as practicable. No project shall be recommended for construction until satisfactory contracts with the purchasers of water have been assured on a basis which will allow of the full repayment of construction cost in addition to meeting maintenance and operation charges. (5) Repayment of construction costs may be had in part from revenue from incidental power developed, or other benefits derived from storage or other improvements. No action was taken by the association on this subject.

"Should the Federal Government Cede the Unreserved Public Lands to the States and if So Under What Provisions," a paper by Robert E. Kennedy, with John E. Field and Charles A. Trimmer collaborating, brought out the wide divergence of opinion existing in the various public land states concerning the cession of the public lands to the states. Mr. Field expressed the opinion that both surface and subsurface rights should be ceded to the states. He described the organization which has existed in Colorado for a great many years to administer state lands, bringing out the fact that it is altogether practicable for the states to administer public lands in an efficient manner, untainted by politics or graft. No action was taken by the association.

Earthquake Loads for Dam Design

Prof. Camillo Guidi, of the University of Turin, Italy, reviews in *L'Ingegnere* of June, 1930, p. 375, the question of earthquake stresses on reservoir dams, with reference to the studies for the new Pasadena dam in San Gabriel Canyon, California. For buildings in seismic zones in Italy a fixed rule has been laid down by the government which may be summarized as an increase of 50 per cent in vertical loads, and a horizontal load ranging from one-sixth to one-eighth of the weight of the structure above the point in question. No similar rule has been laid down for dam construction. Not long ago two Italian dams, in the Garfagnana on the Corfino River and on the Scoltenna River, were involved in earthquakes without damage. They are special structures, of moderate size and in reinforced concrete. Professor Guidi proposes that for dam construction in earthquake zones the vertical loads be augmented by 50 per cent and a horizontal load be assumed at one-eighth of the weight of the structure.

Structural Design of Chicago's Subway

Plans of 3 1/3-Mile Route on State St. Show Box Structure of Steel Bents on Reinforced-Concrete Floor Slab—Side Walls and Roof of Jack Arches—Loop Station to Be 3,700 Ft. Long

PLANS for Chicago's subway have been completed to the point of showing how the structure is to be built. Some 200 drawings of the structure, which is estimated to cost $44,500,000, have been approved by the board of local improvements. An ordinance covering these plans and estimates is now before the city council, where it must be accepted without change or rejected. Essentially, the project consists of a four-track subway 3⅓ miles long under State St., extending from Eighteenth St. north across the Chicago River to Chicago Ave and turning west along Chicago Ave. to Franklin St. Connections are made at both ends of the route to existing elevated lines. More than one-third of the line will be taken up by five stations, the main station in the Loop, extending from Congress St. to Lake St., being 3,700 ft. long. A general map of the route and various details of the structure are shown herewith.

In general, the subway consists of a roof and walls of concrete jack arches supported by a structural-steel frame and a floor of reinforced concrete. The latter is reinforced against an upward hydraulic pressure of 90 lb. per cubic foot. The steel bents are spaced 5½ ft. on centers. There are, in general, three rows of interior columns. Between stations the columns are spaced longitudinally 5½ ft. on centers, and in the station areas they are placed at every third bent or 16½ ft. on centers. North of Madison St. the Loop station widens out to correspond with the change in width of State St., requiring five rows of interior columns.

The subway will be built in open cut and will almost completely fill the street space between building lines. Although it will lie in a soft, water-bearing formation of gravel and clay, which increases in density in proportion to depth, the designers have finally concluded that no special foundations and piles or caissons will be necessary. The subway structure, entirely incased in waterproofing, will be placed just as close to the surface as possible, averaging but 5½ ft. of cover. Utilities will be placed on top of the box and not along the sides as originally intended.

All stations will have continuous platforms and continuous overhead mezzanines or passenger concourses. A 9-ft. clearance is provided for all of the concourses except at street crossings, where the concourse roof will be dropped to a 7½-ft. clearance. The heights of the mezzanines in the New York subways average 7 ft. 8 in. Station platforms vary from 20 to 24 ft. in width, all being of the island type. The space beneath the platforms is utilized for ventilation ducts. All columns will be incased in concrete, the portions projecting through the ventilation ducts being streamlined to provide a minimum resistance to the passage of air.

Existing structures do not offer serious complications to the subway construction. Elevated columns at both ends of the subway will have to be underpinned during the construction of the approaches. Existing elevated lines are crossed at Lake St. and Van Buren St. A line of the Chicago freight tunnel runs down State St., but it is deep enough to cause no interference. A few changes will be necessary in the caisson foundations of Wacker Drive to permit the building of the subway box. One railroad is crossed, the St. Charles Air Line (Illinois Central) at 16th St. There are streetcar tracks over the entire distance of the subway route. As State St. is on a drainage divide line there are no trunkline sewers to take care of. A few sewer siphons may be necessary, but studies are being made with the idea of eliminating them. A great many buildings along the route will require underpinning.

The river tunnels, 1,900 ft. long, consist of one double-track and two single-track tubes. The subaqueous section of the tunnels will be steel tubes sunk in place and lined with reinforced concrete, similar to those in New York under the Harlem River and the LaSalle St. tunnel in Chicago. (See *Engineering News*, Aug. 11, 1910, p. 165; Jan. 12, 1911, p. 52; April 13, 1911, p. 461; and Sept. 21, 1911, p. 330; *Engineering Record*, April 15, 1911, p. 412.) For the approaches, alternate construction of a shield-driven tunnel or open cut may be used. The design indicates the approximate amount of steel required to give adequate strength to either type of structure.

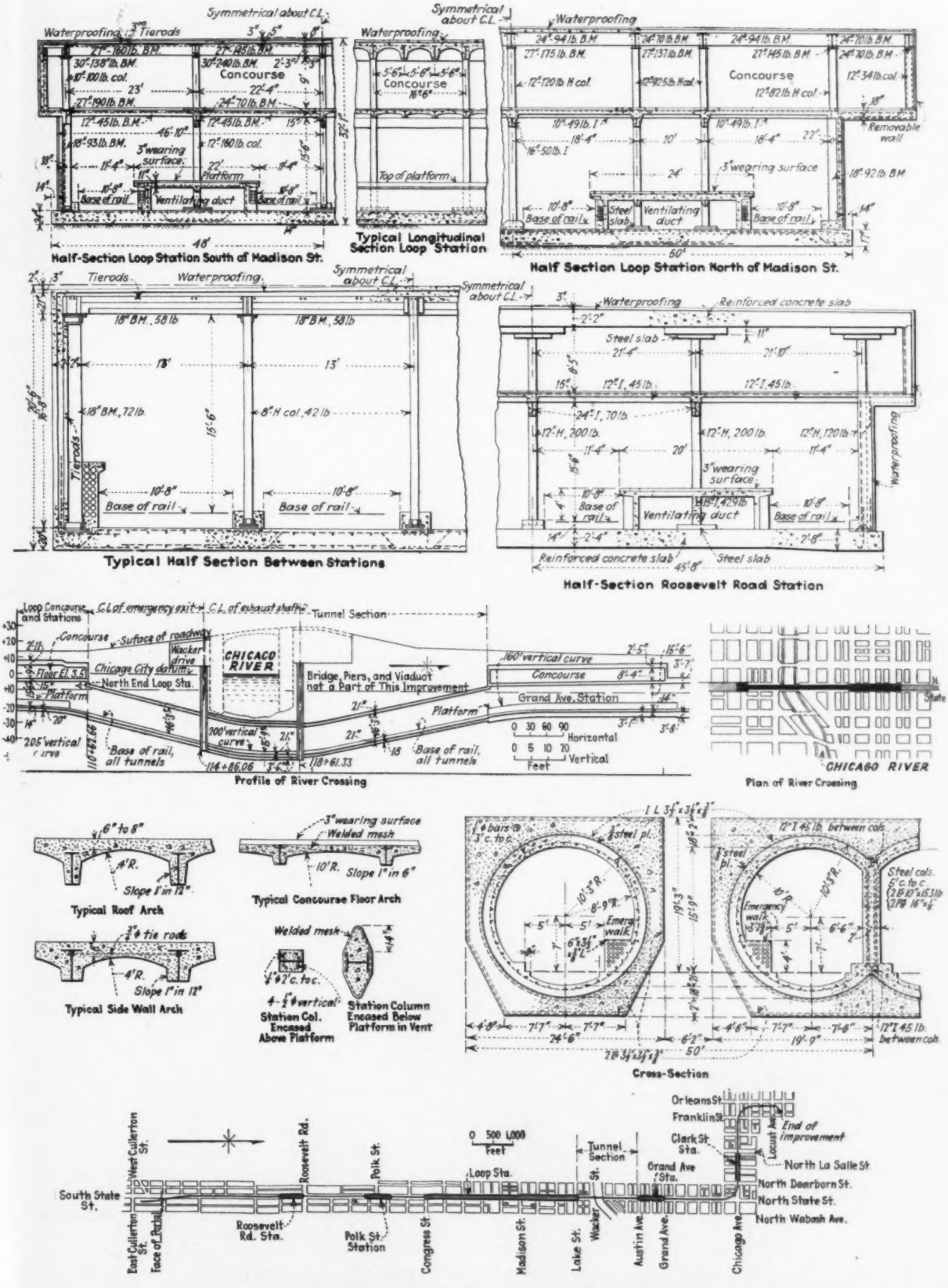
Since the city is building only the shell of the subway, leaving to the operating company the matter of providing its equipment, no arrangement of tracks, of station layout or of electrical installation is available. The plans show the ventilation system, drainage and lighting of those portions of the subway up to the pay entrances. Forced ventilation is planned, but many details are still undecided. Essentially, five regular fresh-air fan houses and three exhaust stations for emergencies are provided to control air supply, which ordinarily will be changed seven to eight times per hour, with a maximum of ten times per hour.

ESTIMATED COST OF CHICAGO SUBWAY

Excavation	$20,306,000
Concrete	5,887,050
Structural steel	4,219,600
Sand fill	1,551,000
Waterproofing	875,000
Floors	814,750
Ventilation	411,800
Miscellaneous, 50 items	5,151,500
Deficiency in interest	1,959,300
Tunnel under river	3,354,000
Total	$44,500,000

The river tunnel will be paid for entirely from the accumulated traction fund. Special assessment on benefited property owners is looked for to cover 65 per cent of the remaining $41,146,000, the balance to be public benefit and to come from the traction fund.

Engineers engaged on this work include the following: Robert Ridgway, New York, consulting engineer; an advisory subway engineering commission consisting of George M. Wisner, chairman, R. F. Kelker, Jr., chief engineer, George C. D. Lenth, Edward J. Noonan, and David A. Wallace. The commission is retained by the committee on local transportation of the city council. Under Mr. Kelker are C. E. DeLeuw, assistant chief engineer, and Leonard C. Childs, principal assistant subway engineer. The engineers of the board of local improvements who are concerned with this subway work are A. J. Schafmayer, George C. D. Lenth, A. Engh and William S. Mantonya.



MAP AND STRUCTURAL DETAILS OF STATE ST. SUBWAY, CHICAGO

Asphalt Surfacing for Low-Cost Highways

Practices Discussed at Ninth Annual Asphalt Paving Conference Include Surface Treatment, Plant-Mixed and Mixed-in-Place Surfacing, Sand-Asphalt Roads and Mat Coating

Engineering News-Record Staff Report

PRACTICE in the use of bituminous materials for low-cost road improvement was the major subject of discussion at the paving conference held in Memphis, Tenn., Dec. 1-4, 1930, under the management of the Asphalt Institute. Extracts are given here of special features of eight of the papers devoted to this subject.

Alberta Climate Requires Plant Mix—Climatic conditions have prevented entire success with either surface treatment or mixed-in-place processes in the province of Alberta, Canada. As stated by H. P. Keath, chief maintenance engineer of provincial roads, frequent cool periods and the fact that even in warm periods only a few hours in the middle of the day were warm enough for satisfactory work made mixing in place economically impracticable. When the viscosity of the oil was lowered to meet the temperature conditions it was found that there was not sufficient binder to retain a compacted surface. Frequent rains also caused costly delays.

After two seasons of experience with the mixed-in-place process, trial was made this season (1930) of plant mix on 10 miles of road, and the results appear encouraging. The material, mixed in a regulation hot-mix asphalt plant, was hauled to the road, spread and compacted by traffic. Rolling was tried and discarded as not giving as smooth a surface as did traffic with occasional light blending for four or five days. Experience indicates that non-volatile liquid asphalts ranging in viscosity from 700 to 1,200 seconds at 122 deg. produce mixtures which can be blended for several days at temperatures as low as 40 deg. The mixture was about 30 lb. of liquid asphalt to 1,000 lb. of aggregate, or 2.91 per cent by weight of asphalt. With mixers located at the pits, plant mix, it is believed, will compare favorably in cost with mixed-in-place surfacing on extensive work.

Surface Treatment Found Advantageous

Virginia Uses Surface Treatment Largely—Of 7,132 miles of state highway in Virginia, stated J. J. Forrer, maintenance engineer, 2,260 miles are surface-treated, sand-clay, earth, and gravel roads, and 1,080 miles are surface-treated macadam. These roads, graded to engineering standards, provide quickly for local needs and form an excellent foundation for other pavements.

The macadam construction consists of one 10-in. course of 1- to 4-in. broken stone rolled down to 8 in. with a 10-ton roller. Dust, screenings and water are then applied and a final rolling is given. The surface is swept and a surface treatment is given in two applications each of ½ gal. per square yard, and each application is followed with a chip course of 15 to 20 lb. A brown drag is used to spread the chips, and then the surface is rolled. The surface treatment costs about 20c. a yard, and the average contract price for the macadam has been about 90c. a yard.

In surface-treating the earth types of roads, two applications of ½ gal. are made and each is covered with crushed bank sand or local creek sand, stone chips or washed gravel. This is smoothed with the broom drag and rolled. The covering material runs from 25 to 30 lb. a yard. The cost of the clay and sand-clay types is $1,500 to $1,700 a mile. This first treatment is good for upward of a year, then the road is again treated with ½ gal. of rapid-curing oil and from 25 to 35 lb. of chips, gravel or slag. A fair average maintenance cost of such a road is 2c. a yard. Subsequent treatments at intervals of four years cost 8c. a yard.

Special equipment practice has counted largely in the cost of these surface treatments. A light tractor with a rotary broom in front and an 11-in. blower behind, with the blower nozzle extending down to the road surface, cleans the road in one trip at a saving over ordinary methods of 50 per cent. Chip spreaders give better distribution and reduce the cost 25 per cent compared with spreading by hand. For long hauls of bituminous material, tanks on light, fast trucks are used to supply the distributor, instead of running it to the tank car. By this method the distributor is kept in nearly continuous operation.

Lime Rock Base Used in Florida

Surface Treatment of Florida Lime Rock—Florida has 1,389 miles of surface-treated lime-rock base which has been surface-treated at a cost of 19c. to 25c. per yard. As described by H. C. Weathers, testing engineer for the highway department, the soft lime rock is spread 10 or 11 in. thick on the subgrade and compacted by roller to 8 in. thick after watering. The surface treatment consists of first broom-cleaning the base and then with a pressure distributor applying 0.2 gal. per yard of oil and blotting it with sand. After several days' curing, this prime coat is broom-cleaned and 0.5 gal. of oil is applied at 200 to 250 deg. About 50 lb. per yard of cover material is hand-cast over the oil, broomed even and rolled. The cover material on square-mesh sieves grades: 1 in., 100 per cent; ¾ in., not less than 90 per cent; ½ in., 20 to 60 per cent; No. 4 mesh, 0 to 10 per cent. The lime-rock base costs about $1 a yard. Maintenance this year has cost about $4 a mile per month, with traffic varying from a few vehicles per day up to 2,000 vehicles. Some trouble has been had from bleeding, which made a slick surface, but this is being cured with the coarser covering material specified above.

Tests for Mixed-in-Place Works—The experience in the Far Western states is that success in mixed-in-place surfacing depends upon the manner in which the aggregate takes the oil and upon using the right compound of oils. Two tests have been developed for determining the receptivity of the aggregate, and a number of formulas for determining the quantity of oil have been derived.

The tests for aggregate are the swell test, first used in Arizona, which will be described by the inventor in our issue of Jan. 1, 1931, and the emulsion test. In the emulsion method ten grains of the fines passing a 200-mesh sieve are combined in an 8-oz. wide-necked bottle with 50 c.c. of 60-70 per cent road oil at a temperature of 130 deg. The mixture is stirred 5 min. with a rotating-paddle electric mixer. Then 100 c.c. of water at 130 deg. is added and the stirring continued for another

5 min. In this test unsatisfactory fines will separate from the oil and be deposited at the bottom of the bottle, while the satisfactory material will remain in the oil.

Mixed-in-Place Practice in West Virginia—As typical of the practice on 164 miles of road constructed in 1930 H. J. Spelman, state highway engineer, described a 26-mile operation, 20 miles on knapped stone and 6 miles on gravel. The base was swept clean and primed with ¼ gal. a yard virtually the whole length before any top course was started. As all hauling was over one end, this priming did much to prevent injury of the base by the traffic. The priming was freshened by $\frac{1}{10}$ gal. a yard just ahead of placing the aggregate. This was gravel, 60 per cent crushed, from 1½ to ½ in., spread 2¼ in. thick. Traffic was allowed over the gravel until just before oiling, then it was spread by a 12-ft. tractor-drawn grader and given ½ gal. a yard of cutback asphalt. The surface was then disk-harrowed to a thorough mix, bladed to a center windrow, turned back and spread. The second application of 0.55 gal. was made and the material was disk-harrowed and bladed back and forth several times and smoothed down. Dragging was then continued until the material set up, when it was rolled thoroughly with a 10-ton roller. After all the road was finished as described, a chip course of about 20 lb. a yard was spread, treated with 0.35 gal. a yard, dragged and rolled.

With an average haul of 18 miles, the unit prices for this construction were as follows: asphalt, 12½c. a gallon; gravel, $3.85 a ton; cleaning old surface, 1c. a yard. The cost per mile of 18-ft. surface was $6,840, giving a cost of 57c. a yard. This is a higher than average cost because of the long haul.

Current Practice in Sandy Coastal Regions

Sand Asphalt in North Carolina—Recent practice in using local sand for inexpensive asphalt surfacing in the coastal sand areas in eastern North Carolina was described by W. E. Hawkins, construction engineer of the state highway department. This construction, first undertaken in 1922, has provided cheap roads in the sparsely settled coastal plain, where little material other than sand is available for road building.

The surfacing is laid in two courses between 2x8 in. by 15-ft. plank forms firmly staked and left in place. The base mix is 7½ to 8 per cent asphalt, 50-60 penetration, and 92 to 92½ per cent sand. The mixing is done in a standard asphalt plant located at the sandpit. Where this is adjacent to the railroad the filler and asphalt are brought in by car, otherwise they are trucked in to the plant. The mix at 300 to 350 deg. is delivered by truck to sheet-metal dump boards and spread by shovels. Finishing machines then shape the surface and it is rolled. Before surfacing, a squeegee coat of $\frac{1}{12}$ to $\frac{1}{16}$ gal. a yard of 50-60 asphalt is applied to the base course, which when rolled is 3 in. thick. This squeegee coat is absolutely necessary for bonding the top course.

The top course is 2 in. thick when rolled, and the mix is 10 to 10½ per cent asphalt, 8 to 12 per cent filler dust and 79 to 82½ per cent sand. The top is machine finished and rolled like the base. The densities on recent projects range from 1.80 to 1.95 for base and 1.95 to 2.10 for top. These surfaces for 16- to 18-ft. roads cost from $1.12 to $1.34 a yard. Since 1922 the state has constructed 500 miles of sand-asphalt roads on both loose sand and sand-clay subgrades.

Sand-Asphalt Roads in Massachusetts—Cape Cod, with its sand soil, is the center of sand-asphalt construction in its state. It is the custom to set up the plants at points where sand, which is more than 60 per cent of the mix, is available; asphalt and stone screenings are hauled in.

The asphalt is 60-70 penetration and constitutes 5½ to 6½ per cent of the mix. Screenings are added in a proportion to supply the deficiencies in grading of the sand.

As described by H. C. Holden, district engineer, the foundation requirements for sand asphalt are the same as for any other type of surface. On the Cape Cod sand the subgrade is hardened by adding 4 to 6 in. of loam and clay mixed. The surface mixture is hauled onto the road at a temperature of not less than 150 deg., dumped onto boards and completely rehandled to place. Raking and rolling follow the usual good practice. A surface showing no more than ¼ in. variation in 10 ft. is required. All surfaces are built in two course.

Figures of cost of 173 miles of state road show a cost of $20,000 to $21,000 a mile for 24-ft. surfacing, 4½ in. thick, sealed with ¼ gal. a yard and sanded. The cost of maintenance for roads from two to seventeen years old was $58.05 a mile, or $0.0048 a yard.

Cost of Hot and Cold Mix Compared

Cold and Hot Mix Surfacing Contrasted—Stating that many types of bituminous surfacing were represented by Wisconsin practice, C. R. Stokes, materials engineer, described his experience this year in surfacing a gravel road to obtain a comparison of cold-mix and hot-mix procedure. The road was 14.05 miles long and 20 ft. wide. It had a full 3-in. bituminous surface with a 5-in. thickened edge extending in 1 ft. It was built in two sections by different contractors. One 6.15-mile section had a 2-in. mixed-in-place base and a 1-in. top of cold premixed bituminous material. The other ¾-mile section had a 1-in. asphalt-concrete top on a 2-in. binder course, both laid hot. For both sections the methods of construction were such as good practice prescribes for each process and type of material. Both base and top of the hot-mix work were machine finished.

Comparing labor, quantity of material used, and plant employed, the following data are given:

In the cold-mix operation, spreading stone required three trucks, one crane and three to five men. Applying bitumen and general work on mixed-in-place base required one distributor, three trucks, two blade graders, two rollers and nine men. Premixed top required the same trucks and rollers and sixteen men. About 200 cu.yd. of stone and 1,975 sq.yd. of top were placed per day. The materials required were: cutback asphalt for base, 60,330 gal.; cutback asphalt for seal course, 12,023 gal.; crushed stone for base, 6,100 cu.yd.; premixed top mixture, 7,434,000 lb.

For the hot-mixed operation, there was a plant crew of one foreman, two engineers, eleven laborers and five trucks and drivers, and a placing crew of one foreman and nine laborers on forms and turntable, one foreman, two roller-men and twelve laborers laying. The average output per ten-hour day of 3-in. surfacing was 1,600 sq.yd. The materials used were: 12,750 tons of binder and 4,973 tons of top.

In both operations the priming of the gravel required one distributor and three men; the oil used was respectively 48,888 gal. and 45,614 gal.

The county prepared the grade at a cost of $1,100 a mile. The contract prices were: 72,830 sq.yd. of cold mix at 96c.; 87,418 sq.yd. of hot mix at 93c.

The engineering for the whole project cost $8,721. Including engineering, the cost per mile was $12,891.

From Job and Office

Hints That Cut Cost and Time for the Contractor and Engineer

Low-Cost Materials May Be Expensive

By G. W. Maker
Aberthaw Co., Boston, Mass.

WHEN a contract is closed and a progress schedule laid down in detail, it frequently develops that while the delivery of some one item of material may determine the rate of progress of the work, the actual cost of that material is secondary, as the time element affecting the whole contract is the true governing factor. A case in point occurred in connection with the reinforced-concrete structural frame of the Harvard biological laboratory at Cambridge, Mass. Here, since formwork was the initial major operation in the contract, the controlling item of material was form lumber. Any delay in starting forms would delay the completion of the work, with consequent increase in cold weather expense and in overhead and plant rental.

In deciding whether to purchase the form lumber from local stock or at a lower price from the mill, the problem was analyzed in detail. Using *a* to represent the cost of form lumber, *b* the cold-weather expense item, and *c* overhead and plant rental, the effect of varying the purchases was as follows:

	a	*b* + *c*	Total
1. All mill delivery	$8,000	$20,000	$28,000
2. Minimum stock, balance mill	9,000	18,000	27,000
3. Part stock, part mill	10,000	16,000	26,000
4. Mostly stock, rest mill	11,000	14,000	25,000
5. All stock delivery	12,000	12,000	24,000

It is apparent from the table that the purchase of lumber on the lowest cost basis would actually add several thousand dollars to the cost of the contract as a whole. In this case, therefore, it appeared that the most economical procedure was to pay a premium for lumber from stock. As a matter of fact, final planning showed that all stock lumber was not a necessity, and purchase was made on a basis approximating condition 4, saving an additional thousand dollars and at the same time adhering to the most economical completion date.

Concrete Cofferdam Braces and a Novel Pile-Pulling Rig

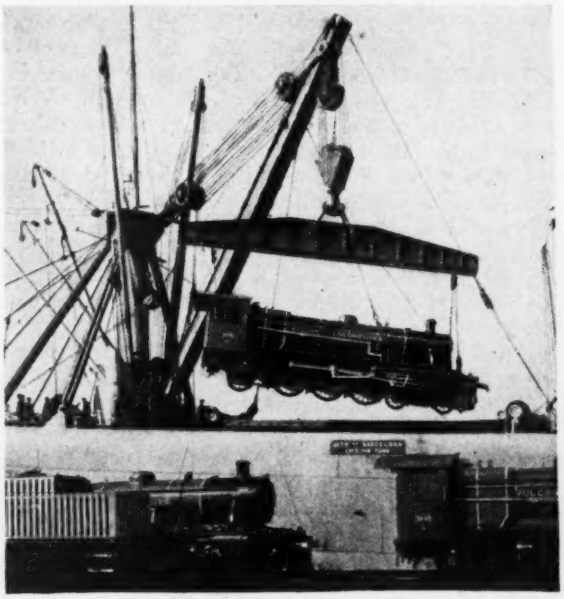
CONCRETE bracing for large cofferdams and a built-up timber shear-leg for pulling steel sheetpiles were used in building the foundation for a reinforced-concrete railway bridge across the Meuse River at Renory, Belgium. For the abutments, 38x72 ft., cofferdams were formed by steel sheetpiles 33 to 40 ft. long. As the excavation proceeded, two sets of reinforced-concrete bracing were built in place, each including sills, corner diagonals and two crossbeams 42 ft. long, with horizontal diagonal members or kneebraces at each end. With this arrangement three large open spaces were available for excavation. A quick-hardening cement was used, so that the bracing could be put under load without delay. Only side forms were used for the braces, the concrete being poured directly upon the floor of the pit and the beams having no intermediate support when the excavation was carried below them. Sheets of tar paper were placed between the sills and the steel sheeting to prevent the concrete from sticking to the steel and hampering the removal of the piles.

For pulling the steel piles of all the cofferdams, a shear-leg 59 ft. high was built up of planks. This carried a twelve-part tackle leading from a steam hoist to a compressed-air pile-pulling hammer. As guys could not be used on account of adjacent railroads and buildings, the head of the shear-leg was held by a horizontal steel arm pivoted to the top of a timber tower or scaffold. The arrangement was such as to give an exactly vertical pull on the pile and thus reduce the friction of the interlocked joints. A record was made with 23 piles pulled in an eight-hour day.

These methods are described in a paper on the Renory viaduct in the *Bulletin* of the International Railway Congress Association, by J. Dubus, engineer for the Belgian National Railway Co., and R. Loontjens, director of works.

Steamer Has 150-Ton Derrick for Hoisting Locomotives

BUILT for the special purpose of carrying locomotives as cargo, the British steamer "City of Barcelona" has special hull construction and, on its forward deck, a derrick of 150 gross tons capacity, so that it can load and discharge the engines without the aid of dock cranes. A cylindrical mast with rigid guys, or stiff-legs, supports four ordinary cargo booms and also a long box-girder boom with a stretcher girder from which the locomotive is suspended by slings, as shown in the accompanying



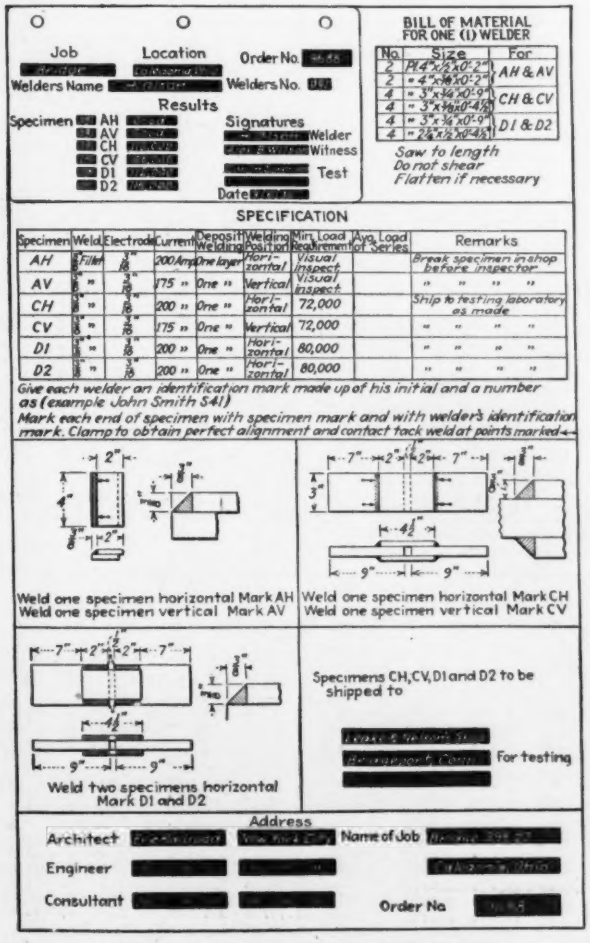
STEAMER LOADING LOCOMOTIVES WITH ITS OWN DERRICK

illustration. The main hatchway, served by the derrick, is 51 ft. long and wide enough to allow placing the last two engines side by side directly under the hatch. Each deck has two tracks, on which the engines are first moved to position by cables, and then traversed on skids to the sides of the ship by means of tackle. In a 115-ft. length of the hold there is only one interior post, which supports a heavy longitudinal girder to carry the deck beams.

Form for Qualifying Welders

BEFORE a welder is allowed to do any work on projects handled by the Leake & Nelson Co., welding engineering organization of Bridgeport, Conn., he must first prepare the specimens shown on the accompanying field-welding test sheet. As soon as the specimens are completed they are sent to a laboratory and tested, the results being noted on the test sheet and a copy of this sheet sent to the architect, engineer or owner of the project. If the results are approved, the welder is allowed to go to work.

In addition to this qualification test, welders must make similar specimens each week while the project is under construction. The test sheet here reproduced is filled out for a welder who was employed on a bridge repair job for the Erie Railroad. It will be noted that the welder's specimens broke appreciably above the minimum load requirement.


Job
Location
Order No.
Welders Name
Welders No.
Results
Specimen
AH
AV
CH
CV
D1
D2
Signatures
Welder
Witness
Test
Date
BILL OF MATERIAL FOR ONE (1) WELDER
No. Size For
2 PL 4"x½"x0'-2" AH & AV
2 " 4"x½"x0'-2"
4 " 3"x¼"x0'-9" CH & CV
4 " 3"x¼"x0'-9"
4 " 2½"x½"x0'-4½" D1 & D2
Saw to length
Do not shear
Flatten if necessary
SPECIFICATION
Specimen Weld Electrode Current Deposit Welding Welding Position Min. Load Requirement Avg. Load for Series Remarks
AH Fillet 200 Amp One layer Horizontal Visual inspect Break specimen in shop before inspector
AV " 175 " One " Vertical Visual inspect " " " "
CH " 200 " One " Horizontal 72,000 Ship to testing laboratory as made
CV " 175 " One " Vertical 72,000 " " " "
D1 " 200 " One " Horizontal 80,000 " " " "
D2 " 200 " One " Horizontal 80,000 " " " "
Give each welder an identification mark made up of his initial and a number as (example John Smith S41)
Mark each end of specimen with specimen mark and with welder's identification mark. Clamp to obtain perfect alignment and contact tack weld at points marked
Weld one specimen horizontal Mark AH
Weld one specimen vertical Mark AV
Weld one specimen horizontal Mark CH
Weld one specimen vertical Mark CV
Weld two specimens horizontal Mark D1 and D2
Specimens CH, CV, D1 and D2 to be shipped to
For testing
Address
Architect
Name of Job
Engineer
Consultant
Order No.

WELDING QUALIFICATION TEST SHEET

Concrete Sewer Design Adopted as Standard After Severe Test

AS THE city of Richmond, Va., is planning to construct about 25,000 lin.ft. of large sewer within the next five years, studies have been under way for some time leading to the development of a standard horseshoe-type reinforced-concrete sewer section equivalent in capacity to circular pipe with diameters from 60 to 144 in. Salient features of the section finally adopted, which was designed by James Bolton, chief of the bureau of surveys and designs of the Richmond department of public works, are: (1) Vertical and horizontal diameters are practically equal to the diameter of an

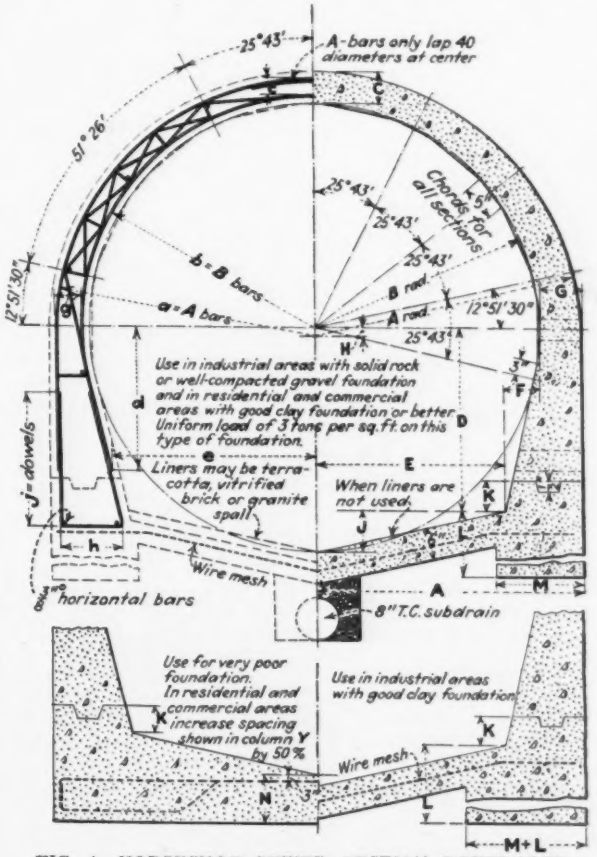

25°43'
A-bars only lap 40 diameters at center
51°26'
Chords for all sections
b=B bars
a=A bars
B rod
A rod
12°51'30"
Use in industrial areas with solid rock or well-compacted gravel foundation and in residential and commercial areas with good clay foundation or better. Uniform load of 3 tons per sq.ft. on this type of foundation.
Liners may be terra-cotta, vitrified brick or granite spall
When liners are not used
J=dowels
Wire mesh
horizontal bars
8" T.C. subdrain
Use for very poor foundation. In residential and commercial areas increase spacing shown in column Y by 50%
Use in industrial areas with good clay foundation
M+L

FIG. 1—HORSESHOE SEWER SECTION DEVELOPED IN RICHMOND

equivalent circular section. (2) Except where the foundation is extremely soft, the invert in no way acts as a structural part of the design; therefore the stability of the arch and walls would not be affected by the washing out of the invert. (3) The sheathing of the trench can be used as the outside form up to the springing line. (4) The design, as a whole, is sufficiently flexible to be adjustable to soils of different bearing capacities.

Detailed dimensions and quantities used in the section adopted are given in Tables I and II. As a final check on the design, a test was conducted upon an 8-ft. section equivalent in size to an 84-in. circle. Since the foundation upon which this was constructed was very poor, a heavily reinforced-concrete mat was first laid extending 6 in. beyond the outside of the section. The arch was constructed upon this mat and allowed to age for ten

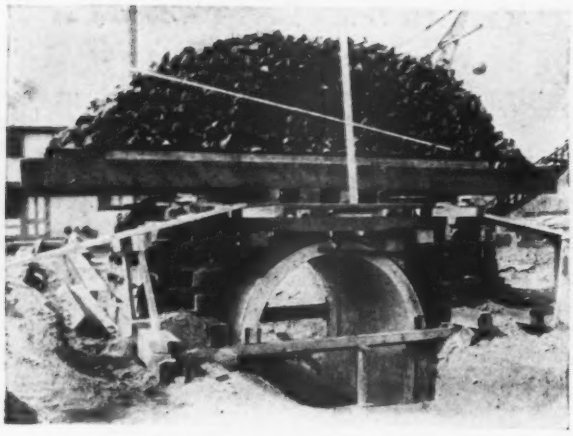


FIG. 2—TEST LOAD OF 153,458 LB. APPLIED TO SEWER ARCH

days, with a steam-curing period of 72 hours. Forms were removed at the end of 60 hours, revealing the fact that the concrete was considerably honeycombed. A 6-in. test cylinder showed an ultimate strength of 2,000 lb. per sq.in. at the end of 60 hours while another, at the age of six days, failed under a load equivalent to 2,900 lb. per sq.in.

Load was applied to 90 deg. of the arch section by piling pig iron on a superimposed platform, as shown in Fig. 2. As the loading was increased, deflection readings were made at intervals. When the load reached a total of 129,419 lb., hair cracks developed almost directly in the center of the intrados at both ends. These cracks, however, did not extend as far as the line of the first reinforcement, which was 8 in. from each end. In order to see whether the crack would open farther, this load was maintained unchanged for a total period of sixteen hours. However, neither crack increased in size, nor could any increase in deflection be noted. Loading was then resumed until a load of 153,458 lb. had been applied. This resulted in additional hair cracks developing in the intrados at each end and near the center of the crown, these being about 2 ft. long.

During removal of the load, the north end of the arch resumed practically its original shape, but the deflection at the south end continued, indicating that at this point the elastic limit of the steel probably had been reached. Maximum deflection at the north end was 0.1 in. at the center of the crown, as compared with 0.02 in. at the south end. During the unloading operation, the latter deflection increased 0.6 in. Deflections at all other points were less than the crown deflection. During the test the entire arch swung 0.01 in. to the west without any indication of spreading. Movements of the heel, measured under extreme load conditions, were as follows:

Southeast corner	0.04 in. out
Southwest corner	0.06 in. out
Northeast corner	0.04 in. in
Northwest corner	0.03 in. out

In connection with these movements at the heel, it should be noted that there was a clean separation between the concrete mat supporting the arch and the heel on each side of the arch, giving opportunity for free movement.

Specimens of reinforcing steel removed after the test indicated that the steel was in nowise strained. It developed a yield point of 43,000 lb. per square inch, and a breaking strength of 64,000 lb. per square inch. This led the designer to the conclusion that the cracks which developed might be considered due either to the breaking of the bond or simply to the tension failure in the concrete brought about by the elongation of the steel on the tension side.

From Job and Office

Hints That Cut Cost and Time

TABLE I—CONCRETE DATA

Equiv. Dia.	Dimensions From Fig. 1 (Inches) A	B	C	D	E	F	G	H	J	K	L	M	N	Concrete Per Ft. of Sewer: No. Liners Cu. Yd.	With Liners Cu. Yd.	Liners Per Ft. of Sewer Sq. Yd.
60	35½	30	5	24½	25½	4½	5½	½	5½	6	10	11	10	0.383047	0.35706	0.4675
66	39½	33	5½	26½	27½	5½	6½	1	6½	6	10	12	10	.44352	.41497	.5139
72	42½	36	5½	29½	30½	5½	6½	1½	7	6	10	13	10	.50897	.47785	.5601
78	46½	39	5½	31½	32½	6½	7½	1½	7½	6	10	14	11	.57874	.54504	.6065
84	49½	42	6	34½	35½	6½	7½	1½	8	6	10	15	11	.65277	.61650	.6527
90	53½	45	6½	36½	37½	7½	8½	2	8½	8	10	16	11	.72955	.69070	.6990
96	56½	48	6½	39	40½	7½	8½	2½	9½	8	10	17	13	.81362	.77221	.7454
102	60½	51	6½	41½	42½	8½	9½	2½	9½	8	12	18	13	.91899	.87463	.7916
108	63½	54	7	44	45½	8½	9½	2½	10½	8	12	19	13	1.01110	.96454	.8379
114	67½	57	7½	46½	47½	9½	10½	3	11	8	12	20	14½	1.10753	1.05839	.8842
120	70½	60	7½	49	50½	9½	10½	3½	11½	8	12	21	14½	1.20821	1.15651	.9305
126	74½	63	7½	51½	52½	10½	11½	3½	12	8	12	22	14½	1.31313	1.25885	.9768
132	77½	66	8	53½	55½	10½	11½	3½	12½	8	12	23	16½	1.42237	1.36551	1.0231
138	81½	69	8½	56½	57½	11½	12½	4	13½	8	14	24	16½	1.54978	1.49035	1.0694
144	84½	72	8½	58½	60½	11½	12½	4½	13½	10	14	25	16½	1.67393	1.61734	1.1157

Dimensions in column (L) are minimum allowable. All concrete to be 1: 2: 4 mix, testing 3,000 lb. per sq. in. at 28 days. Entire arch to be poured monolithic, without horizontal construction joints except where shown at invert. Vertical construction joints to be well keyed.

TABLE II—REINFORCEMENT DATA

Equiv. Diam.	Dimensions from Fig. 1 (Inches) a	b	c	d	e	g	h	j	Bars A and B	Spacing	Wire	Steel Per Unit of Reinforcing: A-Bars	B-Bars	Wire	Dowels (Lb.)	Steel Per Ft. of Arch: Bar	Wire	Mesh Per Ft. of Invert	Steel Per Ft. of Mat: Bars, In.	Space, In.	Weight, Lb.
60	34½	31	3	16½	26½	3½	9	25½	½	8	#6	13.0142	10.9074	19.167	5.0000	21.51840	1.88450	2.33332	½	6½	12.7566
66	38½	34½	3	19½	19½	4	9½	25½	½	8	#6	14.2728	12.1422	20.750	6.0625	22.95609	2.04014	2.53564	½	6½	13.8798
72	41½	37½	3	21½	31½	4½	10½	25½	½	8	#6	15.5314	13.3770	22.166	5.1250	24.39378	2.17936	2.80000	½	6½	14.9847
78	45	40½	3½	24½	34½	4½	11½	25½	½	6½	½	16.8226	14.5791	23.958	5.2083	31.60920	2.24654	3.03332	½	7	21.9937
84	48½	43½	3½	26½	36½	5	12½	25½	½	6½	½	18.0812	15.8139	25.875	5.2708	33.44944	2.42630	3.28332	½	7	23.4956
90	51½	46½	3½	27	39½	5½	13	27½	½	6½	½	18.9648	16.6737	27.625	5.6667	34.98749	2.59040	3.51668	½	7	24.9975
96	55½	49½	3½	29½	41½	5½	14	32½	½	9	#3	20.6728	17.8758	29.208	6.5833	45.38729	4.62655	3.75000	½	8	32.3208
102	58½	52½	3½	32	44½	6½	15	32½	½	9	#3	21.9641	19.0778	21.252	6.6667	47.67884	4.93020	4.00000	½	8	34.1093
108	62½	55½	4	34½	46½	6½	16	32½	½	9	#3	23.2554	20.2799	32.854	6.7500	49.97038	5.20407	4.23332	½	8	35.8976
114	65½	58½	4½	37	49½	7½	17	32½	½	7½	#3	24.5467	21.4819	34.916	6.8333	61.66404	5.53069	4.46668	½	9	44.3515
120	69½	61½	4½	39½	51½	7½	18	32½	½	7½	#3	25.8379	22.6840	36.812	6.9167	64.41406	5.83102	4.70000	½	9	46.4285
126	72½	64½	4½	41½	54½	8½	19	32½	½	7½	#3	27.0876	23.8444	38.750	7.0000	67.07502	6.13800	4.95000	½	9	48.5050
132	76½	67½	5	44½	56½	8½	20	37½	½	10½	#0	28.7956	25.0465	41.125	7.9167	78.86648	10.30593	5.18332	½	9½	61.7110
138	79½	70½	5½	46½	59½	9½	21	37½	½	10½	#0	30.0869	26.2485	42.666	8.0000	81.93779	10.69210	5.41668	½	9½	63.9485
144	83½	73½	5½	47½	62½	9½	22	39½	½	10½	#0	31.0449	27.1173	44.604	8.4167	84.61204	11.17776	5.65000	½	9½	66.6907

All dimensions are to center of steel. Joints in steel to be welded except where laps are shown, where they will be wire-tied. Bars to be plain or deformed.

From Job and Office

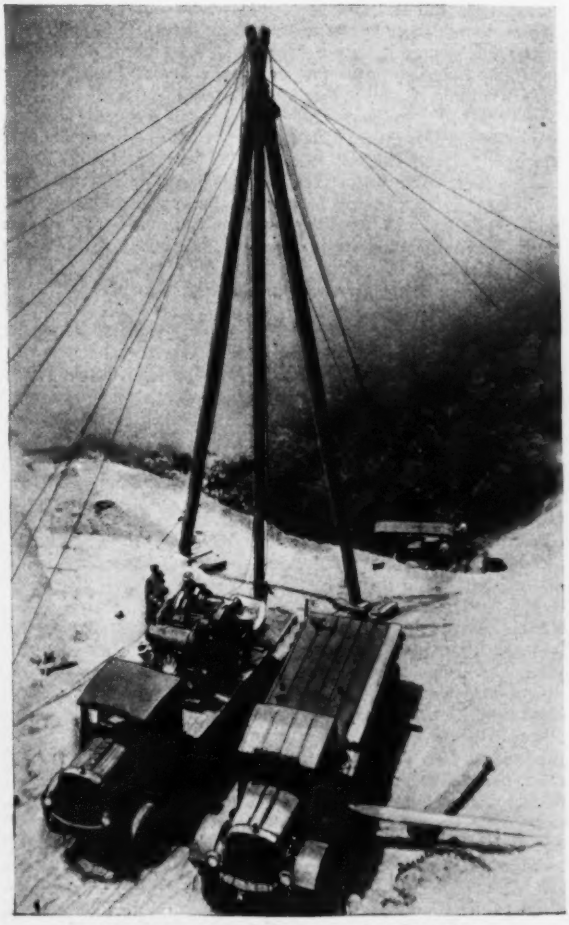
For Contractor and Engineer

Thirty-One-Ton Power Shovel Returned to Road After 100-Ft. Slide

IN THE construction of the Arroyo Seco Road in southern California, which is being built by contract for the California highway commission, a 1-cu.yd. power shovel belonging to the contractor went over the edge of an embankment, whence it rolled and slid to a point about 100 ft. below the road. Two days later the shovel had been brought back to the road and was found to have suffered only minor damage.

In planning recovery of the shovel, it was decided that the most practicable way to retrieve it would be to drag it up the face of the embankment down which it had rolled. This made it probable that the pull required would be about three times the weight of the shovel, which was 31 tons, and the necessary equipment therefore was arranged to handle a 100-ton load with a suitable safety factor.

A crew of five men and a foreman with three truckloads of equipment were sent to the job. Shear legs consisting of two 50-ft. poles were set up as shown in the accompanying illustration. A six-part block and fall was slung from the top of the shear legs and the hauling line was attached to a gasoline-engine hoist on one of the truck bodies. Guy wires to near-by trees were forbidden, so all guys had to be anchored to deadmen.



RETRIEVING A HEAVY POWER EXCAVATOR
The shovel went down a 100-ft. embankment and was brought back without serious damage.

The crew and the equipment were on the job a total of 29 hours, in which time the shears were set up, the tackle rigged and the shovel dragged back to a safe position on the road grade. Three poles appear in the picture because the gin pole which was used to erect the shears was not in the way and therefore was left in place to be ready for dismantling the rig after the job was completed. Four guy lines were used on the gin pole and four others on the main shear legs.

The contract on the road-grading job is held by the Morgan Paving Co., of Los Angeles. A contract for bringing the shovel back to the roadway grade was executed by Allen Brothers, hauling contractors, Los Angeles, for whom F. A. Carmouche, vice-president, was in charge of the work described in the foregoing.

Job and Office Note

ON SURVEYS remote from a base, where packing surplus weight is a serious problem, a single camp stove may be used to heat two tents by the simple method of pitching them close together with entrances facing. The flaps forming the doors are overlapped, giving the effect of a double room.

G. GOODWIN, *Ottawa, Ont.*

Letters to the Editor

A Forum for Discussion of Views of Engineers and Contractors

Flow of Water Around Bends

Sir—The letter on the flow of water around bends by W. D. Mitchell and L. Harrold in the Nov. 6 issue of *Engineering News-Record* is interesting. It is noted that their river bend was approximately 180 deg. and that the gaging station was about midway around the bend. They get the section of maximum velocity near the outer bank. It is unfortunate that the writers did not secure gagings nearer the beginning of the bend, for it is believed that entirely different velocity distributions would have been obtained.

To discuss intelligently the velocity distribution obtained by Messrs. Mitchell and Harrold it would be necessary to have a map showing the alignment of the river for some distance both upstream and downstream from the bend and also the velocity distribution in the channel approaching the bend. These factors, as well as others, materially affect the velocity distribution in bends of rivers.

In a river bend of 180 deg. with the approach and discharge channels straight and with uniform velocity distribution in the channel approaching the bend, the water next to the inner bank at the beginning of the bend travels faster than the water next to the outer bank because it has a shorter distance to travel. Hence the water surface next to the inner bank tends to drop below the elevation of the water surface at the outer bank. As the water moves around the bend the thread of maximum velocity shifts from the inner bank at the beginning of the bend to the outer bank at the end of the bend.

The undersigned doubts if it is possible to take a number of gagings at a single station on a bend of a river and state that the results are applicable to all bends. Another bend may have entirely different velocity distribution, since this factor, as before stated, is influenced by many other factors.

Messrs. Mitchell and Harrold state that the water surface was 1.3 ft. higher at sta. 30 than at sta. 100 and desire an

explanation of this apparent phenomenon. This condition is natural in river bends and is due to centrifugal force. The writers are referred to Prof. S. M. Woodward's book, "The Hydraulics of the Miami Flood Control Project," Part VII, pp. 264-273, published by the Miami Conservancy District, Dayton, Ohio. Colonel C. McD. Townsend in his book, "River and Harbor Construction," pp. 18-21, mentions observations on the Mississippi River where differences of head of 1 ft. have been observed on opposite banks of bends with mean mid-section longitudinal slopes of about 0.4 ft. per mile. The writers are also referred to Professor Thomson's work in the *Proceedings* of the Royal Society, May 4, 1876, p. 356 (see also "Collected Papers in Physics and Engineering of Prof. James Thomson," by Sir Joseph Larmor and James Thomson, 1912). A. W. Brightmore in the *Proc.* Inst. C.E., Vol. 169, 1907, pp. 315-336, discusses differences of water level on opposite banks of bends. R. H. Gockinga discusses the flow around bends and derives a formula for computing the difference of elevation of the water surface transversely across the bend in his article, "The Transverse Slope and Its Influence Upon the State of Rivers," *Annales des Ponts et Chausées*, Vol. 83, 1913. E. Bayerhaus discusses the principles on which the actual movement of water in bends takes place in his article, "The Effects of a Bend in Open Watercourses on the Movement and Shape of the Bed" (Die Wirkungen einer Krümmung in Offenen Wasserläufen auf Bewegungsvorgang und Bettgestaltung), *Zeit für Bauwesen*, 1922, pp. 156-163.

Many other references could be quoted to support the statements in the original paper in *Engineering News-Record* Sept. 4 and to explain the reasons why the water stands higher on the outside of the bend than on the inside.

It is difficult to understand why the water stands higher at sta. 30 than at sta. 0 of the writers' figure. It would appear that the actual water surface was more easily obtained at sta. 0 than at sta. 30, since with a mean velocity of over 12 ft. per sec. at sta. 30, the exact water surface at that point was probably more difficult to obtain. The bank of the channel at sta. 0 apparently tended to dampen down the oscillation of the waves.

DAVID L. YARNELL,
Senior Drainage Engineer,
U. S. Bureau of Public Roads,
Iowa City Hydraulic Laboratory.

Iowa City, Iowa,
Nov. 12, 1930.

The Higher the Bars the Better the Jumper

Sir—One of the editorials in *Engineering News-Record* of Oct. 16, carried a head "Higher Bars for Engineers." For me, the higher the bars the better the jumper. I believe in more education and higher education if we have something to work on. Education is a thing that never ceases throughout a lifetime. The man who says his learning is complete is already dead. The man who has an engineering mind can always learn, although the colleges have taught him all they have to teach; and the man who never learned any more than he was taught in college would never be able to do anything more than teach in college.

When a young man starts out for an education the first requisite is to find out whether or not he would like to be what he is going to be for the remainder of his life and then work hard for the goal.

I have had real engineers in my employ who never saw an engineering college but who could ride roughshod over a Yale or Harvard man—and I have seen something of both. There are engineers, lawyers and doctors who could best serve their country as shoe cobblers.

W. O. DOLLARHYDE,
Construction Engineer.

Salyersville, Ky.,
Nov. 10, 1930.

Value of Load Distance Saved

Sir—In reference to the value of savings in distance on highways, there are one or two brief comments which may be made on the letter of T. P. Young in your issue of Nov. 6.

In stating that all operating costs are not affected by distance, he of course is right, but he assumes too low a cost for operation of the average vehicle using the main highways, to which figures of this kind usually apply.

In the paper on "Highways as Elements in Transportation," published in the August *Proceedings* of the Am.Soc.C.E., the writer shows that, taking only the elements of operating cost referred to by Mr. Young, the cost for average traffic may be taken at 11.5c. per mile, using only the items affected by distance. With an assumed traffic of 18,000,000 vehicles per annum, the capitalized cost of the savings on this basis is nearly $7,000,000 per 1,000 ft.

The fact that the type of pavement affects such estimates applies only to the assumption as to cost of operation for the type of pavement selected; it does not apply to the comparison of location, inasmuch as for this purpose it must be assumed that the type of pavement is the same on both lines. The economic value of one type of pavement over another is an entirely different matter.

Incidentally, it is also interesting to note the growing appreciation of the application of principles of economic location in connection with the reconstruction of our main highways and through-traffic arteries.

F. LAVIS,
President, International Railways of Central America.

New York City,
Nov. **10,** 1930.

Preparedness for Engineers

Sir—Few members of the engineering profession will deny the present necessity for keeping abreast with new developments in the technical field, as well as with progress in the greater arena of non-technical activities. The motto of the successful engineer is "Preparedness." He must have at his immediate command the perfect answer to the unexpected emergency. To rely on uncertain judgment or on memorization of theories gleaned from a college education is insufficient. He must, from the moment he enters the ranks of professional engineers, concentrate every moment of his spare time upon increasing his fund of technical knowledge, not only that he may advance in the professional world but that he may sharpen his mental faculties and obtain self-confidence.

Unfortunately, the spare time of the average employed engineer is too limited to permit extensive study. In view of this fact, contributors of articles to engineering magazines would render a greater service if they were to write simply and explicitly and avoid ambiguous and verbose statements, giving explanations by plans and diagrams wherever possible. Lengthy formulas and their derivations should be left to textbooks and technical articles published by the engineering societies.

I am pleased to observe that *Engineering News-Record* shows recognition of this fact.

MORRIS MOE LIEBESKIND,
Structural Engineer,
Thompson-Starrett Co., Inc.

New York City,
Nov. 19, 1930.

Contractor's Loss From Delayed Acceptance

Sir—I was interested in reading an editorial in your issue of Nov. 6 entitled "A Peculiar Case," for it recalled an almost identical case that came under my observation about 40 years ago.

My father had the contract for constructing an eight-span truss highway bridge across the Potomac at Point of Rocks, Md., south of Harper's Ferry. This bridge had been completed and was ready to be turned over to the county commissioners when the rains preceding the Johnstown flood began. This inclement weather prevented the commissioners from inspecting and accepting the bridge on the date they planned. The rains continued and the water in the river rose, finally reaching the under side of the bridge, and debris floating down the river washed out four spans.

While I do not remember all the details in connection with the settlement, I do recall that there was considerable controversy as to who should stand the loss, and I believe it was finally compromised in some manner. This apparently is almost an identical case with that mentioned in your editorial.

H. T. WELTY,
New York Central R.R. Co.

New York City,
Nov. 14, 1930.

News of the Week

Would-Be Workers on Boulder Dam Form Long Bread Lines

Because of the rush of workmen to Las Vegas, Nev., in search of work on Boulder Dam, that city has what is reported to be the longest bread line of any city of its size in the country. The Las Vegas office of the employment service, recently opened to handle the employment situation during the construction of the project, is warning job hunters to stay away unless they have sufficient capital to tide them over two or three months of unemployment.

The Salvation Army aided 7,039 persons in Las Vegas during October, while a total of 10,745 applied for assistance. Few jobs will be available, present indications reveal, until around March 1, if then.

$110,000,000 Voted by House for Emergency Construction

An emergency construction fund of $110,000,000 was reported favorably on Dec. 9 by the appropriations committee of the House of Representatives and, 3½ hours later, was passed by the House itself without a roll call. The fund, as approved by the committee, is as follows:

River and harbor work	$22,500,000
Flood control on the Mississippi River and tributaries	3,000,000
Federal-aid highway system advances to the states	80,000,000
Roads and trails for national forest development	3,000,000
Roads and trails in national parks	1,500,000

The committee's explantion of the $80,000,000 item to advance to the states for use in matching federal-aid funds is, in part, as follows:

> The appropriation of $80,000,000 for federal-aid highways constitutes an advance of funds to the several states for expenditure for such highways and is intended to enable the states to meet the requirements of the federal highway act, as amended, as to state funds required on federal-aid projects. The practical effect of these advances will be to furnish funds which will serve as state funds for the purpose of matching federal appropriations made for carrying out the regular apportionments of federal aid.
>
> These advances to the states would be reimbursed to the United States under the terms of this appropriation over a period of five years, commencing with 1933, by deducting the amounts so advanced from the regular federal-aid apportionments made during the five years commencing with 1933.

Amendment of the bill in the House so as to extend the limitation on the road-building item until Sept. 1 satisfies the Senate that this will provide adequate time for the absorption of the emergency money. It also has been decided to make no effort to eliminate the $15,000 per mile limitation as it applies to the emergency funds. With these two controversial points removed, it is expected, as this is written, that the Senate will promptly approve the bill in substantially the same form as it passed the House.

Advance Figures for Public Works to Be Undertaken in 1931

A SUMMARY of public-works construction to be carried out next year, based on partial returns from a countrywide survey by *Engineering News-Record*, indicates that more work will be done than in either of the two preceding years. The indicated increase over 1930 is 43 per cent, and over 1929, a specially heavy year, 36 per cent.

The present estimate is:

1929	$2,862,000,000
1930	2,724,000,000
1931	3,901,000,000

Revised estimates will be published in subsequent issues based on more complete returns.

$124,000,000 Recommended for 9-Ft. Mississippi Channel

The special board of army engineers appointed to make a survey of the Mississippi River between the mouth of the Missouri River and Minneapolis has recommended in a final report the expenditure of $124,000,000 on the development of a 9-ft. channel between the two points. In all 24 locks and dams would be built in securing a 9-ft. channel between the Missouri River and the Twin Cities if the report is approved by the department of war and Congress.

Pennsylvania Co. Ordered to Give Up Control of Two Railroads

The Pennsylvania Co., a subsidiary of the Pennsylvania Railroad Co., has been ordered by the Interstate Commerce Commission to divest itself of control of the Wabash and Lehigh Valley railroads, such control being held by the commission to be in violation of the Clayton anti-trust act. The Pennsylvania Co. owns 48 per cent of the stock of the Wabash and owns or controls through its ownership of Wabash stock a like amount of the stock of the Lehigh Valley R.R.

The Pennsylvania Railroad Co. plans to oppose the commission's order in the courts on the ground that as the Pennsylvania Co. is a holding company not engaged in railroad operation it is beyond the jurisdiction of the commission.

Importance beyond its immediate effect attaches to this order in that its testing in the courts will result in a determination of the commission's authority over holding and similar non-operating companies in perfecting its plans for railroad consolidation.

Dealer's Discount on Cement Abolished by Manufacturers

The majority of cement producers have announced the elimination of the dealer's discount, usually 10c. per barrel, which has long been a sore spot in the construction industry. In its place the manufacturers will pay the dealers 5c. per barrel for cement actually handled. In theory the discount was supposed to protect the dealer and assure him a profit for handling cement; actually the scheme gave rise to many destructive practices. Cement contracts were usually awarded to the dealer who could shave the most off his allowed discount. The Associated General Contractors bitterly fought the discount plan, claiming that the cement companies sold direct to states and large corporations eliminating the discount, but required contractors to buy through dealers at a higher price. A resolution was passed at the fall executive meeting of the A.G.C. calling the attention of the Federal Trade Commission to the discrepancy. The Lehigh Portland Cement Co. led the way in abolishing the discount and about 70 per cent of the country's cement producers have followed suit. Most of the remaining companies are expected to fall in line.

President Appoints Board to Study Timber Conservation

President Hoover has announced the appointment of a timber conservation board to study the economic problems and consequences of overproduction in the forest industries, and to explore the possibilities of sound and workable programs of private and public effort. Funds have been secured from private sources to finance the survey. Secretary of Commerce Lamont will be chairman and the secretaries of agriculture and the interior are members. The remainder of the personnel of the board are men prominent in lumber and forestry circles.

Contract Awarded for Burrard St. Bridge in Vancouver

The contract for the Burrard St. bridge in Vancouver has been awarded by the city council to Hodgson, King & Marble and Dawson Wade & Co., Ltd., both of Vancouver, at a contract price of $1,667,047. This bridge, over False Creek inlet, will give direct access to the Point Grey section of the city, a headland jutting into the Pacific where a residential district is being built up centering around the endowment lands of the University of British Columbia. The bridge is to be constructed of steel with concrete approaches.

San Diego Asks Bids By Advertisement for Engineering Service

THE common council of San Diego, Calif., on Nov. 17 passed a resolution directing the purchasing agent of the city to advertise for bids for the services of a sanitary engineer. When this action came to the knowledge of the local section of the American Society of Civil Engineers the section protested in letters to the individual councilmen. Despite the protest the following advertisement appeared in the San Diego *Sun* of Dec. 1:

NOTICE TO ENGINEERS

NOTICE IS HEREBY GIVEN, that sealed proposals will be received at the office of the City Clerk of the City of San Diego, California, in the City Hall of said City, until 10 o'clock A. M. of the 22nd day of December, 1930, for the furnishing of plans and specifications for the installation and construction of a system for the collection and delivery to certain specified sites of all the sewage of the City of San Diego, said plans to contain estimates of costs for the said system and said plans to show sites on said system to which the said sewage shall be delivered.

Each bidder must accompany his bid with a check upon some responsible bank, properly certified, payable to the City Clerk of the City of San Diego, for a sum equal to five per cent of the aggregate sum of the bid, which check and the moneys represented thereby shall be held by the City as a guarantee that the bidder, if awarded the contract, will in good faith enter into such contract and give the security required for the faithful performance thereof. Such check and the moneys represented thereby otherwise will be forfeited to the city. No bid will be received that is not accompanied by such certified check.

Each bid submitted shall be accompanied by and attached to an affidavit that the bid presented is genuine and not sham or collusive, or made in the interest or on behalf of any person, firm or corporation not therein named; and that the bidder has not directly or indirectly induced or solicited any other bidder to put in a sham bid or to refrain from bidding, and that said bidder has not in any manner sought by collusion to secure to him an advantage over other bidders.

The successful bidder will be required to furnish the City with a bond, with good and sufficient sureties, in a sum equal to twenty-five per cent (25%) of the amount of the contract price, conditioned for the faithful performance of said contract.

The right is reserved to reject any and all bids.

For further particulars and official bid blanks address the Superintendent of the Purchasing Department of the City of San Diego.

(Authorized by Resolution No. 55259.)
Dated this 28th day of November, 1930.
A. V. GOEDDEL,
Superintendent of the Purchasing Department of the City of San Diego, California.
12—1-11 incl

Efforts have since been made to have the council rescind its action and withdraw the advertisement, but letters requesting this course have remained unanswered.

Agricultural Engineers Meet in Chicago

Farm buildings and farm machinery were the main subjects considered at the winter meeting of the American Society of Agricultural Engineers, held in Chicago, Dec. 1 to 3. Separate sessions were held by the structures division and the power and machinery division. Design of farm buildings still is largely based on rule of thumb, but study is in progress as to economic consideration. Thus for dairy barns it is essential to have some definite knowledge of the proper floor space per animal; the lighting, ventilating and temperature conditions; building material, and the reasonable investment cost per animal.

A comprehensive review of answers to a lengthy questionnaire on this particular subject was presented by W. G. Ward, Kansas State Agricultural College, while a report on a research survey of farm structures was read by Henry Giese, Iowa State College. Farm storage of grain and farm house design were the subjects at two sessions. Papers on farm machinery included its relation to terracing and land reclamation as well as to corn and cotton harvesting and general farming operations, with a separate paper on the development of tractors.

New Data on Termite Depredation

As a means of acquainting the public with the various types of destructive wood-eating termites in California and the most promising means of protecting new buildings from termite depredation or of stopping termite attack in old buildings, the University of California has just published a new illustrated bulletin, "Termites and Termite Damage." This bulletin, prepared by Prof. S. F. Light and Prof. Merl Randall, of the university staff, and F. G. White, chief engineer of the board of state harbor commissioners, takes the place of an older publication issued before experiments had been completed on the control of termites by chemical means. The new booklet may be obtained free of charge from the University of California College of agriculture, Berkeley, Calif.

CABLE ERECTION ON THE ST. JOHNS BRIDGE, PORTLAND, ORE.

The last of the 91 rope strands which will go to make up each of the cables of the St. Johns bridge was drawn into place on Nov. 25. Each strand is 1¼ in. in diameter and is made up of 51 wires. The strands are cut to a predetermined length and socketed in the plant of John A. Roebling's Sons Co. at Trenton, N. J. They are shipped on reels to the bridge, where they are pulled into place as a unit. Robinson & Steinman are the engineers.

Moffat Tunnel Lease Upheld by Circuit Court

The railroad lease which permits the Denver & Salt Lake System to use the Moffat tunnel at an annual rental of $355,000 a year is legal and binding, according to a decision handed down by the U. S. Circuit Court of Appeals Nov. 29. The Moffat Tunnel Commission, which made the contract for the railroad, sought to increase the annual rental to $850,000, on the theory that the lease, although binding in other respects, was not legal in respect to the amount of money to be paid.

Legality of the much-litigated supplemental bonds, amounting to $8,750,000, was not involved in the suit.

Oil Pollution Committee Named by Engineering Council

To aid in framing laws prohibiting "the further unnecessary and wanton pollution of all waters under the jurisdiction of the federal and state governments," a joint committee on oil pollution, composed of members of the national engineering societies, has been appointed by the American Engineering Council. Robert Spurr Weston, of Boston, has been chosen chairman, and Abel Wolman, of Baltimore, chief engineer, Maryland state department of health, is the secretary. Both represent the American Society of Civil Engineers. Representatives of other engineering societies are as follows:

American Society of Mechanical Engineers—W. Cullen Morris, of New York, vice-president, Consolidated Gas Co.; W. H. Gartley, vice-president, Philadelphia Gas Works Co.

American Institute of Chemical Engineers—H. C. Parmelee, editorial director, McGraw-Hill Publishing Co.; A. E. Marshall, Corning Glass Co., New York.

American Institute of Mining and Metallurgical Engineers—H. H. Hill, New York, Standard Oil Development Co. A second representative will be selected later.

Two representatives each from the American Petroleum Institute and from the American Steamship Owners Association will sit in consultation with the committee.

The committee will study bills now pending in the House and Senate to protect navigation from obstruction and injury by prohibiting the discharge of oil into coastal navigable waters except in accordance with regulations to be made by the secretary of war. Appropriate amendments to these measures or an entirely new bill will be drafted by the committee for submission to the council at its annual meeting in January, when the council will sponsor definite legislation.

TUNNEL CONSTRUCTION ON WESTERN PACIFIC R. R.

South portal of 700 ft. tunnel No. 9, in Wolf Creek Canyon. The tunnel is on the Western Pacific's part of the joint railway line being built in northern California from Keddie to Bieber, to connect the Western Pacific and Great Northern. The main contract was let to the W. A. Bechtel Co., of San Francisco, Calif., and the Utah Construction Co., of Ogden, Utah, on a joint bid. Subcontracts have been let to eight contractors; Morrison-Knudsen, Boise, Idaho; Paul J. Tyler, San Francisco; Lewis Construction Co., Los Angeles; Utah Construction Co., Ogden, Utah; W. A. Bechtel Co., San Francisco; Heiscot Construction Co., Salt Lake City; Frederickson & Watson Construction Co., Oakland, Calif., and W. H. Puckett Co., Boise, Idaho. The entire Western Pacific project includes 112 miles of railroad line and is expected to be completed early in 1932. J. W. Williams, chief engineer, and T. L. Phillips, principal assistant engineer of the Western Pacific Railroad Co., will have general direction of the project.

George Otis Smith to Head Federal Power Commission

George Otis Smith, director of the U. S. Geological Survey since 1907, has been chosen by President Hoover to be chairman of the new Federal Power Commission. Frank McNinch, of North Carolina, former mayor of Charlotte, has been nominated for the remaining place on the commission. The three other members were nominated prior to the close of the last session of Congress. They were: Frank B. Williamson, of Washington; Marcel Garsaud, of Louisiana; and Claude L. Draper, of Wyoming.

San Francisco Calls for Bids on Privately Owned Incinerator

Bids for the construction of a privately owned and operated incinerator for the city of San Francisco will be received by the city on Jan. 12. The contract provides that the plant shall handle 800 tons of garbage per day and shall revert to the city free of cost at the end of 25 years unless purchased earlier. The bidders may erect the plant on their own plans or those prepared by the city engineer. The charge per ton shall not exceed $1, fixed in the initiative ordinance adopted in 1927 as the maximum charge.

This step has been taken by the San Francisco board of supervisors following the defeat of the $1,200,000 incinerator bond issue for a municipal plant, which was voted on at the Nov. 4 election. The city was ordered to close the old plant several years ago and an injunction to restrain operation of the plant has been pending in the superior court ever since. However, the court has been lenient because of the difficulty in solving the problem.

In order to compensate any private party who might find it impossible to conduct the business on the $1 per ton basis, the supervisors have included certain provisions in the contract, including free rent of the land owned by the city and no depreciation to be figured if the city votes to take over the plant any time during the next 25 years.

Two Members of Maryland Roads Commission Resign

Howard Bruce and John K. Shaw, members of the Maryland state roads commission, have resigned, but will remain in office at the governor's request until the general assembly carries out the road program now planned. G. Clinton Uhl, chairman of the commission, continues in office. The body is composed of three members, the chairman being the only one paid. All three of the present members of the commission were appointed to office in January, 1929, when the governor reorganized the commission following disclosures that there was a shortage of $376,000 in the department.

Contract Awarded for House Office Building

At a meeting on Dec. 2 the House Office Building Commission awarded the contract for an additional House of Representatives office building, adjacent to the Capitol, to the Consolidated Engineering Co., of Baltimore, Md., at the lowest bid price of $5,270,000. The building will be on the block bounded by New Jersey Ave., South Capitol, B and C Sts. S.E., and will be directly across the street from the present House office building. White marble will be used for the exterior, Alabama limestone for the interior, Indiana limestone for lining of the court, and granite for the base of the structure. Congress has authorized $7,500,000 for the building. David Lynn, architect of the Capitol, announces that work on the building will begin promptly.

Newark Adopts Hand-Labor Plan to Relieve Unemployment

In an effort to provide employment for several thousand men desperately in need of work, the city of Newark, N. J., has developed a plan for using hand labor on excavation work in converting an old canal bed into a rapid-transit line and highway. Some time ago bonds were authorized for the purchase of the right-of-way of the old Morris Canal for a distance of 6 miles through the city and for the construction of a rapid-transit line surmounted by a highway in the canal bed. The rapid-transit line, as projected, was to be built in six sections, one section at a time to be completed.

Bids will be received on Dec. 26 for the construction of the first section, Section 3, of the project, estimated to cost $2,500,000 and involving 163,000 cu.yd. of excavation. Under the contract to be let the contractor will be permitted to choose his own method of doing the work, using power shovels if he so desires for excavation. Meanwhile, however, to relieve unemployment the city is going ahead with the excavation work, using hand labor. It is expected some 70,000 cu.yd. will be removed in this manner before the contractor gets to work. As a further measure of relief, hand labor is to be used to start excavation on 125,000 cu.yd. on another section of the subway, work upon which normally would not be started for at least another year.

Between 3,000 and 4,000 men are to be taken care of throughout the winter on this hand-excavation work. Applicants for work are required to register, and the registration cards are turned over to the police department for checking. Needy citizens having dependents are given preference. The workmen are paid 50c. an hour for seven hours' work. Because some of the workers are in need of nourishment when they report for work, the city has set up soup kitchens on the job to supply one meal a day until the men receive their first wages.

James W. Costello, chief engineer of the department of public works, estimates the excavation done by hand will cost $2.50 per yard, against a possible 85c. to $1 per yard under contract. A differentiation will be kept in the cost accounting so that the excess charges due to hand labor will not be carried against the cost of construction, bu will be charged to unemployment relie

In connection with the hand excava tion, no contracts are to be given t large trucking concerns. Instead, ind vidual truck owners are used as long a a sufficient number can be obtained.

Carolinas Branch, A.G.C., Discusses Prequalification at Charlotte

Progress of Bureau of Contract Information and Inclusion of Minimum Wage Rates Clause in Highway Contracts Considered at Annual Convention

Engineering News-Record Staff Report

PREQUALIFICATION of bidders on all classes of construction received unanimous approval in extended discussions during the annual convention of the Carolinas branch of the Associated General Contractors held at Charlotte, N. C., Dec. 2 and 3. The experience of the branch in including in estimates fees for bidding was stated during the meeting to have been uniformly satisfactory to all concerned. Recommendations were adopted looking to the stabilization of wages by the establishment of minimum rates by the state highway departments. The activities of the Bureau of Contract Information, Inc., were considered at length.

In opening a session devoted to the prequalification of bidders, V. B. Higgins, president of the Carolinas branch, expressed the opinion that prequalification was the best policy thus far adopted by the A.G.C. L. R. Ames, formerly state highway engineer of North Carolina and of Louisiana, in outlining the benefits of the work of the bureau, concluded with the statement that the problem of eliminating the irresponsible bidder appeared likely to be at least 90 per cent solved within from three to five years. His conclusion was based on the results the bureau has obtained in fifteen months of operation.

Progress of Information Bureau

S. M. Williams, president of the bureau, called attention to the fact that the information being secured is the first practical effort to provide those who award contracts with material that would justify them in refusal of awards to irresponsible low bidders. He stated that all of the state highway departments are cooperating, and that some 7,000 architects, engineers and others in charge of awards are working in close harmony with the bureau. Accurate rating data on over 3,600 contracting organizations are now in the hands of the bureau, obtained from close investigation of 40,000 construction projects, as well as from bankers, manufacturers and surety companies. Most important of all, according to Mr. Williams, is the reputation for accuracy and fairness established by the bureau.

In discussing the value of prequalification asset statements J. Roy Pennell, of Pennell & Harley, Inc., of Spartanburg, S. C., raised the point of the inclusion of so-called letters of credit, stating that the items referred to were merely letters from bankers promising to the subject concern a certain line of credit. These items have no negotiable value. Mr. Pennell, Mr. Williams and several others urged that such assets be excluded from the financial statements of construction concerns. Nor was the inclusion of a retained percentage as an asset considered by the meeting as good business.

In summing up the experience of the last year of the Carolinas branch of the A.G.C. in including in proposals a bidding service fee, C. W. Angle, of the Angle-Blackford Co., general contractors, Greensboro, N. C., stated as chairman of the ethics committee of the branch that no objection had been voiced against the practice in either state. In fact, his committee was reported to have received practically 100 per cent cooperation both from bidders and from those who award contracts. The policy followed is substantially as stated in an editorial in *Engineering News-Record* of Nov. 27. The policy has been applied only on building construction projects, and has not been followed in the highway and general construction fields.

Ask Minimum Wage Rate

The convention went on record that state highway officials ought to include in their specifications a clause establishing a minimum wage rate. This conclusion was reached without adverse discussion. The action was based on the fact that recently contractors from outside of the states, taking jobs at very low unit prices, pay starvation wage rates, knowing that they have no local community responsibility. In the discussion it was pointed out that similar action is being requested by contractors in other states.

The meeting urged the extension to other states of the recently adopted policy of South Carolina of awarding surface-treatment highway work by contract. The validity of the North Carolina contractors' licensing law was established during the past year, by a court decision which has not been contested, it was reported to the convention. The opinion was expressed that while the law leaves much to be desired it has helped stabilize the industry.

Men Interested in Traffic Control Form New Organization

A new organization for the study of traffic control problems has been organized by a group of engineers specializing in that work. It is to be known as the Institute of Traffic Engineers, with headquarters at 175 Fifth Ave., New York City. Ernest C. Goodrich, consulting engineer, New York, is president; Miller McClintock, director of the Albert Russell Erskine Bureau of Street Traffic Research, Harvard University, is vice-president, and Hawley S. Simpson, research engineer, American Electric Railway Association, is secretary-treasurer.

The primary objects of the organization are: To advance the profession of traffic engineering, to stimulate research in street traffic matters, to encourage and foster traffic engineering education in colleges of engineering, and to establish a clearing house for authoritative pronouncements on matters of street travel. Membership invitations are to be extended to engineers interested in traffic control matters. An important membership requisite, according to the announcement of the formation of the society, will be the submission of a thesis on some subject in traffic engineering not heretofore adequately covered. The next meeting of the institute is scheduled to be held in New York in January, at the time of the annual meeting of the American Society of Civil Engineers.

New Bridges Planned in Quebec

According to the speech from the throne at the opening of the Quebec legislature recently, the provincial government intends to proceed with the construction of several new bridges with the minimum of delay. These will include the Caughnawaga Bridge, across the Richelieu River, at or near Sorel; one across the Yamaska River; one across the St. Francis River, at St. Francis du Lac; and a bridge from the Island of Orleans to the mainland, probably at Beauport.

Two Oregon Cities Seek Permits for Deschutes River Rights

Ralph C. Clyde, city commissioner-elect of Portland, Ore., has filed with the state engineer five separate applications for as many permits to appropriate water from the Deschutes River for the purpose of developing 212,161 theoretical horsepower. Attached to the applications are waivers providing that, in the event of the grants being allowed by the state, they shall be issued in the name of the city of Portland and be used thereafter for the construction of publicly owned and operated hydro-electric plants.

Structural plans accompanying the applications describe the proposed five projects as follows: Dam No. 1, 94 ft. high, developing 38,800 hp., to cost $3,149,300; No. 2, 118 ft. high, developing 47,500 hp., to cost $4,136,000; No. 3, 104 ft. high, developing 44,490 hp., to cost $3,916,000; No. 4, 98 ft. high, developing 33,238 hp., to cost $2,915,000; No. 5, 63 ft. high, developing 51,133 hp., to cost $4,499,000.

David G. Glass, city engineer of The Dalles, Ore., has filed application on behalf of the city for permits to appropriate 9,000 sec.-ft. of water from the same river for the purpose of developing municipally owned hydro-electric power in Wasco County. Description of the proposed projects did not accompany the city's application, other than the horsepower to be developed, which is estimated at 85,000 hp. The state engineer has been informally advised that The Dalles application is probably the first step looking to the creation of a power district under the constitutional amendment approved by the people last November.

Bridge Planned Across Fraser River Near Vancouver

Plans have been filed with the British Columbia provincial government by the Terminal Engineering Co., of Vancouver, for a bridge across the Fraser River near its mouth, linking the municipality of Delta with the city of Vancouver by a short route from Ladner to Richmond, a Vancouver suburban municipality. Approval of the municipalities and of the federal government is necessary before the bridge can be built. According to the plans, the bridge would consist of three 237-ft. steel spans, with a lift span of 312 ft., which would clear high water by 160 ft. The plans are similar to those of the Fraser River Bridge Co. Ltd., which secured legislative approval to build a bridge in 1924, but which did not proceed with the project.

The Business Outlook

The beginning of December shows no significant change in the stagnant business situation and few indications that any change is in early prospect. One thing only may be said with some assurance, which is that the level at which business activity is running shows no signs of going much lower, probably can't, and probably won't unless something has happened to the world that statistical yardsticks never had to measure before. Industrial activity is still sloping down, as usual, to the year end, but from a low level. General trade is pointed up toward the holiday peak. Commodity prices, supported by special stabilization efforts, are steadier, but have not been fully tested as yet.

—The Business Week, Dec. 10.

WASHINGTON NOTES

By Paul Wooton
Washington Correspondent

Jadwin Plan Amendment Put Off Until February—Plans to Maintain Local Wage Rates on Federal Work

AFTER consideration of the subject the war department has announced that it will not be ready until February to submit to Congress the results of its restudy of the Jadwin plan for control of the Mississippi. Since it is not advisable to attempt to modify the act until it is known what changes will be proposed, it is apparent that there is not much prospect for a material revision of the flood-control act at this session.

Maintaining Local Wage Rates

During the first week of the short session of Congress, two proposals were made in the Senate for general legislation requiring that all contracts for federal construction work stipulate that local wage rates be maintained. One bill was introduced by Senator Davis, of Pennsylvania, formerly secretary of labor, the other by Senator Couzens, of Michigan.

The Davis bill sets up a wage determination board appointed by the President, to be composed of one representative each from the labor, war, navy, interior and treasury departments and two representatives from employers regularly engaged in construction work, the representative of the labor department to serve as chairman. The bill requires that all bidders shall be notified, prior to the submission of their bids, of the wage rates that must be observed.

The Couzens bill carries the additional provision that contractors on federal projects shall give preference to workers who have resided for at least 90 days in the community in which the work is being done. Both of the bills apply their provisions regarding the maintenance of wage scales to subcontractors as well as to contractors.

Muscle Shoals Vote Possible

In order to obviate the necessity for an extra session, Representative Snell, of New York, chairman of the rules committee, which determines the priority of legislation, has announced that he will do nothing to prevent the House from voting on pending controversial legislation, including the Norris Muscle Shoals bill. Mr. Snell believes that if there is a large element in the country that wants to experiment with government ownership, Muscle Shoals is the best place to make the experiment. This is because the government already owns the property at Muscle Shoals, he pointed out.

Boulder Dam Appropriation Cut

Because of savings that will be effected in the work, the Boulder Dam appropriation for the next fiscal year has been cut $2,000,000 by the House committee on appropriations. The

bureau of the budget recommended that $17,000,000 be expended on the work. An expenditure of $15,000,000 is authorized in the interior department appropriation bill, reported to the House on Dec. 8.

The total appropriation for the Bureau of Reclamation has been reduced from $7,046,000, as recommended in the budget, to $6,971,000. The appropriation for the Geological Survey, on the other hand, has been increased to $3,132,740. The budget recommendation was for $3,113,320.

Cutting Red Tape

Four specific proposals for legislation to cut red tape now interfering with plans to push construction of federal buildings have been prepared for Congress by President Hoover's committee on unemployment. Approved by the treasury department and the attorney general and sponsored in Congress by Senator Smoot, chairman of the Senate finance committee, and Senator Keys, chairman of the Senate committee on public buildings and grounds, these measures would permit the government to take immediate possession of building sites that have been condemned, authorize the appointment of ten or twelve site-selecting committees to serve during the emergency period, permit outside architects to prepare the specifications as well as plans for public buildings and authorize all cities the postal business of which amounts to $5,000 to own their own post offices. Government-owned post offices may now be erected only in towns where business amounts to not less than $7,500.

Federal aid in the construction of secondary roads is advocated by Fred C. Croxton, field representative of the unemployment committee, in nine north-central states where unemployment is most severe. It is Mr. Croxton's belief that road construction affords the only practical means of providing employment in outlying districts. This proposal would require enabling legislation by federal and state legislatures. The recommendation also contemplates the advance where necessary of federal funds to the states covering the whole cost of secondary road construction, such advances to be held out of future allotments of federal-aid funds.

Society Calendar

AMERICAN ROAD BUILDERS ASSOCIATION, Washington: annual convention and road show, St. Louis, Mo., Jan. 10-16.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting, New York, Jan. 21-23.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Washington; annual meeting, San Francisco, Jan. 25-28.

ENGINEERING INSTITUTE OF CANADA; annual meeting, Montreal, Feb. 4-6.

NATIONAL CRUSHED STONE ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 19-22.

NATIONAL PAVING BRICK ASSOCIATION. Washington; annual meeting, Pittsburgh, Pa., Feb. 4-6.

NATIONAL READY MIXED CONCRETE ASSOCIATION, first annual convention and exhibit, St. Louis, Mo., Jan. 26.

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 27-29.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS will hold its 37th annual meeting in Pittsburgh Jan. 26-29. In addition to a program of technical papers, consideration will be given to several codes which have been developed during the past year.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS is now the official title of the former 35-year old American Society for Municipal Improvements. Action of the board of directors at the recent meeting in Richmond has been confirmed by a favorable vote by membership letter ballot. More than 90 per cent of the present active members are municipal engineers and for many years all the officers have been engineers. The officers remain the same, John W. Reid, Detroit, president, and C. W. S. Sammelman, 4359 Lindell Blvd., St. Louis, secretary.

CAROLINAS BRANCH, Associated General Contractors of America, held its annual convention in Charlotte, N. C., Dec. 2 and 3 and elected the following officers: president, John Caldwell, Greenville, S. C.; vice-president, Earle Whitten, Charlotte, N. C.; treasurer, F. N. Thompson, Charlotte, N. C.; executive secretary, V. P. Little, Charlotte, N. C.; vice-president in charge of public works division, W. S. McClelland, Charlotte, N. C.; vice-president in charge of highway division, F. M. Dietz, Columbia, S. C.; vice-president in charge of building division, F. L. Shackleford, Greenville, S. C.

IOWA SECTION, American Society of Civil Engineers, at a recent meeting in Des Moines elected W. J. Schlick, of Ames, president to succeed Q. C. Ayres, also of Ames. Other officers elected were: vice-president, Prof. F. A. Nagler, of the State University of Iowa; secretary, R. B. Kittredge, Iowa City; treasurer, J. R. Maher, Eldora.

LOUISIANA ENGINEERING SOCIETY after a brief session on Dec. 8 became the guests of the New Orleans committee at the winter meeting of the American Institute of Chemical Engineers, and listened to Major W. H. Holcombe on flood control and Charles H. Herty on "Industrial Possibilities of the South."

NATIONAL SAFETY COUNCIL has decided to hold the twentieth annual safety congress in Chicago on Oct. 12-16, 1931.

NEW ENGLAND WATER WORKS ASSOCIATION at its meeting on Dec. 10 listened to a paper on "Experiences With Water Mains and With Cement-Lined Pipe at Danvers," by Roger W. Estey, superintendent, Danvers water-works. There was a general discussion of the 1929-30 drought in New England and resulting water-works problems which was opened by H. G. Kinniston, district engineer, water resources branch, U. S. Geological Survey, Boston, Mass.

NEW JERSEY PUBLIC HEALTH AND SANITARY ASSOCIATION will hold its 56th annual session in Asbury Park on Dec. 12 and 13. Among other topics will be presented the following: "The Use of Chlorine in Modern Sanitation and Therapeutics," by William J. Orchard, general manager, Wallace & Tiernan; "Flood Control," by M. R. Sherrard, Newark, N. J.; "The District Manager or District Health Officer—His Value in Public Health," by Clarence L. Scammon, director, division of communicable diseases, Boston, Mass.; "Community Program for the Health of the Preschool Child," by LeRoy A. Wilkes, director, division of medical service, American Child Health Association, New York City; "Public Health Laws," by C. A. Macdonald, Jr., New Jersey state department of health.

PACIFIC NORTHWEST SECTION, American Water Works Association, will hold its fourth annual meeting in Portland, Ore., May 14-16.

SAFETY SECTION, American Railway Association, will hold its annual Pacific Coast regional meeting in San Francisco Jan. 19. J. B. Monahan, supervisor of safety for the Southern Pacific Co., has been appointed chairman for the meeting. Safety problems vital not only to railroading but to all industries will be considered.

SOCIETY OF TERMINAL ENGINEERS, New York City, will hold a meeting on Dec. 16, at which the general subject will be "The Keel to Rail Terminal of the Pennsylvania Dock & Warehouse Co., Jersey City, N. J."

TACOMA SECTION, American Society of Civil Engineers, held a ladies' night on Nov. 10. Llewellyn Evans, superintendent of the light department of the city of Tacoma, spoke on the recession of the Nisqually glacier on Mount Tamoca, giving an account of the preliminary work he had done this year to determine the amount and movement of the ice and the amount of runoff from the glacier.

Brief News

BY A VOTE of five to one a waterfront bond issue of $200,000 was approved on Dec. 2 by the voters of Santa Barbara, Calif. The proceeds of the issue will be used for the purchase of ten acres of beach land as a second unit of a proposed $1,000,000 harbor development.

THE METROPOLITAN WATER DISTRICT of Southern California has made an alternative filing with the state division of water resources on 1,085,950 acre-ft. of water from the Colorado River for "immediate use" and an additional 717,000 acre-ft. for storage, as a part of the process of perfecting its water rights on the Colorado.

CONSTRUCTION WORK on the 275,000-hp. hydro-electric development of the Ontario Power Service Corp. at Abitibi Canyon, on the Abitibi River, is reported to be well up to schedule. Completion of the two tunnels through which the water of the river will be bypassed is scheduled for next spring, so that work on the cofferdam can be started soon after the ice is out.

THE CITY COMMISSION of Phoenix, Ariz., will consider bids early in January for the construction of a new sewage-disposal system to cost about $817,000. This construction is not included in the proposed municipal water and sewage system for which bids were requested by Dec. 2 and the cost of which has been estimated at $2,364,000.

Obituary

SUMNER SOLLITT, widely known building contractor, of Chicago, and president of the Sumner Sollitt Co., died Dec. 2. Mr. Sollitt, who was born in Chicago in 1873, had been in the building business continuously since 1888, when he was fifteen years old. In 1927 he was elected president of the Associated General Contractors of America.

ROBERT MCNEW, 83 years old, a pioneer general contractor of Indianapolis, died recently at his home. He lived in North Vernon, Ind., for several years before locating in Indianapolis.

Construction Equipment and Materials

Wood Lining in Metal Pipe Resists Corrosion

Resistance to attack from corrosive liquids is provided in a new type of pipe developed by the Michigan Pipe Co., Bay City, Mich., by means of an interior lining of Douglas fir staves with tongue-and-groove longitudinal joints installed under heavy pressure. On the exterior a lightweight solid metal shell is used, made of a corrosion-resisting alloy. This is dipped in asphalt and then painted, on the exterior, with aluminum paint. Various weights and types of pipe are available to meet different pressure requirements. The standard pipe, supplied in sections up to 24 ft. long, is equipped with flanged joints. It is suitable for suction as well as for pressure lines.

SECTION OF WOOD LINED METAL PIPE

Precast Gypsum Slabs Used in Assembled Roof Construction

To meet the demand for a lightweight, permanent, fire-resistant roof at a reasonable cost the Structural Gypsum Corp., Linden, N. J., has developed a construction utilizing gypsum slabs with which the amount of field labor necessary is reduced to a minimum. This is designed for use with purlin spacings up to 7 ft. 9 in. centers where the live loads do not exceed 30 lb. per sq.ft. An essential feature is the factory assembly of units long enough to extend from purlin to purlin, usually from 5 to 8 ft. These units are built up on a pair of specially designed rolled-steel sub-purlins between which are carried a number of 30-in. hollow gypsum slabs. On the job these units are placed in parallel lines approximately 30½ in. apart, the spaces between being filled with additional slabs of the same size used in the unit. All joints are flushed with gypsum grout even with the top surface.

Manufacture of the unit in the factory makes possible the economies of quantity production, as well as permitting the use of an economically-shaped sub-purlin which would not be practicable if used in the field. According to the manufacturer this sub-purlin is lighter in weight than any other section on the market of comparable strength. As the bulk of the work is done in the factory, this permits a closer control of labor cost and reduces field work to a minimum.

For use on pitched roofs, a small plate is riveted to the sub-purlin on each unit. These plates are bent around the top flanges of the purlins to form a clamp and prevent movement.

LAYING ASSEMBLED ROOF UNITS
Note use of single slabs between rows of assembled units.

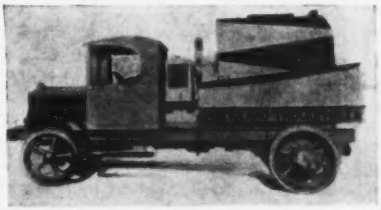
Small Air Compressor Built for Ready Portability

A new two-stage, air-cooled, electric motor-driven air compressor that can be used in outdoor or exposed locations throughout the year without danger of freezing is a recent addition to the line of the Ingersoll-Rand Co., 11 Broadway, New York City. The outfit is made in two styles: a direct-connected unit for installations that are fairly permanent, and a V-belt-driven unit for contractors and others who desire a semi-portable machine. The latter, type TLC, has a piston displacement of 155 cu.ft. per minute and is designed for 100 lb. discharge pressure. It is particularly applicable to structural steel work and general contracting service, since it requires no water connections. The compressor and its driving motor are mounted on a single sub-base, making a compact, self-contained unit that can readily be moved. A lifting bail can be attached to facilitate moving from floor to floor, or for handling on and off a truck. Lubrication and control are automatic, and the machine operates only when air is being used. Ball bearings are used on both motor and compressor and require no adjustment. An air-sealed unloader protects the motor by unloading both cylinders and intercooler whenever the compressor stops.

PORTABLE AIR-COOLED COMPRESSOR

Body Designed for Carrying or Mixing Concrete

In order to provide a carrier for ready-mixed concrete which can also be used for mixing en route and which will at the same time be free from vanes, fins or other internal obstructions, the Portland Concrete Machines Co., Cleveland, Ohio, has introduced the Portland truck mixer, which can be mounted on any standard 5-ton motor truck chassis.



MIXER-CONVEYOR BODY

The unit is separately powered by a 7½-12-hp. four-cylinder LeRoi engine. The unique shape of the drum, with offset hexagonal heads and triangular panels sloping alternately forward and back, keeps the contents thoroughly mixed, and retains the plasticity and workability of the concrete for more than three hours. Loading and discharge openings are unusually large and easily operated, and the outward flow of concrete can be controlled accurately by toggle-operated butterfly doors. The unit is equipped with a stub chute discharging up to 43 in. above grade, and also a one-piece, 8-ft. swiveling extension chute.

When desired, a flanged, removable top section is provided so that the drum can be used as an ordinary dump body. The unit is now ready in the 3-cu.yd. size; a 5-yd. model is forthcoming. The design has aimed at economy both in weight and in cost. It is entirely covered by pending patents.

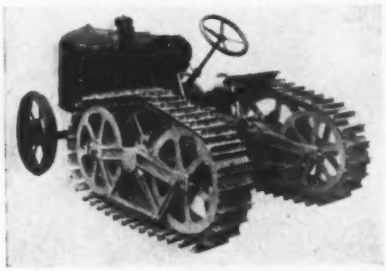
Spray Nozzle Washes Gravel

To increase the efficiency of gravel- and stone-crushing plants the Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill., has recently announced a line of gravel-washing nozzles which discharge water in full mass formation throughout the entire cross-section of the spray. The nozzles are designed with a stationary internal two-vane helical core which forms two distinct rotating jets. These impinge on each other in the upper portion of the nozzle body and are discharged at an included angle of approximately 70 deg., providing complete distribution. The manufacturer claims that revolving or vibrating screens, when equipped with these nozzles, not only produce a cleaner product but have the added advantage of greater capacity. The nozzles have no moving parts and are available in all commonly used sizes. For best results, the manufacturer recommends elevating the nozzle approximately 18 to 24 in. from the material to be washed, and operation at pressures of not less than 20 lb., with 75 to 100 lb. preferred.

SPRAY NOZZLE

Crawler Treads Replace Tractor Drive Wheels

Semi-crawler tracks for attachment to McCormick-Deering tractors in place of the usual rear-drive wheels are now being manufactured by the Moon Track Co., McCormick Building, Chicago, Ill. These tracks fit on the standard tractor rear axle and can be attached in a short time. The steering mechanism, including the front wheels, remains intact, but is aided by two foot brakes, one applied to each crawler, which are used in making short turns. The treads are driven by a power sprocket at the center of the track engaging at both the top and the bottom. These sprockets are made of solid manganese steel. The track shoes are of chrome alloy steel, heat treated. Timken bearings and Alemite-Zerk lubrication are other features of the crawler.



SEMI-CRAWLER ATTACHMENT

Compact Electric Sump Pump

Electric drive is used in a 2½-in. pier-hole pump recently announced by the Domestic Engine & Pump Co., Shippensburg, Pa., for either deep or shallow pumping where space is restricted. The pumping unit, located at the lower end of the shaft, has an impeller designed to handle the usual dirty or sandy water found in excavations on construction work. The pump will run in any position, either vertically or on an angle, as long as the motor is kept out of the water. It has an over-all length of 6 ft., suction and discharge openings to fit a 2½-in. pipe thread, a weight of 260 lb. and a maximum diameter of 11 in., so that it will fit into a hole 1 ft. in diameter. The motor used is a 5-hp., 220-volt, three-phase unit for use with 60-cycle alternating current. It is fitted with 75 ft. of waterproof service cable with plug and receptacle. Pumping capacity of the unit varies from 250 gal. per minute at a head of 10 ft. to 100 gal. per minute at a 50-ft. head.

ELECTRIC PUMP

Costs and Contracts

E. N.-R. Index Numbers

	Cost			Volume	
Dec. 1,	1930	196.86	Nov.,	1930	207
Nov. 1,	1930	198.54	Oct.,	1930	211
Dec. 1,	1929	209.46	Nov.,	1929	245
Average,	1929	207.02	Average,	1929	317
Average,	1928	206.78	Average,	1928	287
1913	.....	100.00	1913	.....	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Dec. 11, with some comparisons, total as follows:

(In Thousands of Dollars)

	Dec. 11, 1930	Average of Last Four Weeks 1930	1929
Buildings:			
Industrial	$4,679	$3,150	$10,007
Other	14,639	17,590	23,689
Streets and roads..	6,150	7,421	5,500
Other eng. constr..	21,754	12,343	7,727
Total	$47,222	$40,504	$46,924

Total, all classes Jan. 1 to Dec. 11:

1930 ..... $3,085,013

1929 3,882,737

Business Notes

AMERICAN STANDARDS ASSOCIATION, 29 West 39th St., New York City, announces the formation of a light metals group, the 45th member-body of the association with representation on the ASA Standards Council. The first member of the new group is the Aluminum Company of America.

NATIONAL LUMBER MANUFACTURERS ASSOCIATION, through its executive committee, has approved a budget approximating $1,000,000 for activities during 1931. Items for which this money will be spent include research, field promotion work, educational promotion, building code service, and advertising.

GYPSUM ASSOCIATION, 211 West Wacker Drive, Chicago, Ill., has opened a district office at 11 West 42d St., New York City, in charge of J. Kent Smith, district engineer.

BROCKWAY-MOTOR TRUCK CORP., Cortland, N. Y., announces the resignation of Stephen G. Thompson as sales promotion manager. His work will be carried on by Gerald D. Shira, who will act as advertising manager.

BYERS MACHINE CO., Ravenna, Ohio, has appointed the Balzer Machinery Co., Portland, Ore., its distributor in western Oregon and Washington.

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., has acquired the stock and good will of the sheet metal division of the Richards Company, Inc., Boston, Mass.

G. H. WILLIAMS CO., Erie, Pa., has appointed G. S. Swanson as Western sales manager, with headquarters at Chicago, to succeed C. F. Welblen, who has been transferred to Erie.

JOHN A. ROEBLING'S SONS CO., Trenton, N. J., on Jan. 1 will take over the business of the New Jersey Wire Cloth Co., a subsidiary. On that date that corporate existence of the latter company will cease.

NITRALLOY CORPORATION announces that it has engaged the services of Victor O. Homerberg, associate professor of physical metallurgy at the Massachusetts Institute of Technology, to act as its technical director.

TRUSCON STEEL CO., Youngstown, Ohio, has taken over the Genfire Steel Co., which will function as its dealer and commodity division under the direction of W. B. Turner. The sales organization of the Genfire company will be merged with that of Truscon.

HERCULES MOTORS CORP., Canton, Ohio, announces the appointment of four new distributors: J. S. Innes, Ltd., Toronto, Ont.; Tractor & Thresher Co., Ltd., Saskatoon, Sask.; E. B. Kelley Co., New York City; and A. H. Krigger & Co., Pittsburgh, Pa.

AMERICAN MANGANESE STEEL CO., INC., Chicago Heights, Ill., has appointed the Southern Tractor Supply Co., Durham, N. C., exclusive representative for the sale of crawler tractor links and sprockets in a territory extending from the District of Columbia to South Carolina and westward through the eastern part of Tennessee.

READING IRON CO., Reading, Pa., announces the election of P. N. Guthrie, Jr., as president. Mr. Guthrie, who succeeds Leon E. Thomas, resigned, has been serving as vice-president in charge of sales. Harold S. Bard has been appointed district sales representative, with offices in the Engineering Building, Chicago, Ill. Mr. Bard succeeds R. A. Griffin, resigned. R. W. Thompson, advertising manager, has also assumed the duties of director of public relations.

NOVO ENGINE CO., Lansing, Mich., announces the appointment of E. B. Goodwin as Eastern district manager, with offices in the Graybar Building, New York City. He will be assisted by J. A. Winkler. M. A. Waldo, Far Eastern representative of the company, has started on an extended trip which will cover Honolulu, Japan, China, the Philippines and Straits Settlements. He will report to the company on the extent of this field and the present and potential market for power units and contractors' equipment.

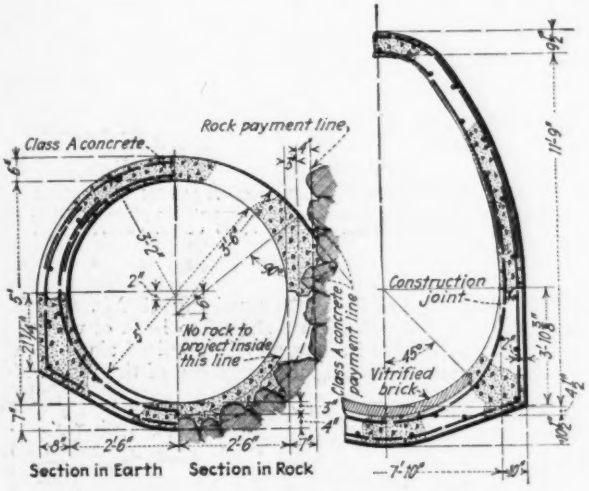
NORTHWEST MACHINERY CO., Boise, Idaho, was recently organized for the purchase of machinery and supplies used by contractors. The new company will occupy space at 710 Front St., Boise, Idaho, handling a complete line of construction equipment, including trucks, shovels and scrapers, as well as automobile accessories and all parts, and is authorized to engage in all forms of public and private contracting and building. A. C. Tracy has been named general manager.

Unit Prices From Current Construction Bids

Reinforced-Concrete Sewers in Louisville

TWO contracts totaling 6,073 lin.ft. of reinforced-concrete sewers were awarded in November in Louisville, Ky. Con. 50, for Sec. A of the Peachtree Ave. sewer, was for 1,409 lin.ft. of 8⅛x12½-ft., 1,629 ft. of 7⅞x11¾-ft., and 837 ft. of 7½x11¼-ft. inverted egg sewer. Con. 51, for the Goss Ave. sewer, was for circular sections: 180 ft. 60-in., 1,428 ft. 54-in., 200 ft. 45-in., 390 ft. 36-in. In both contracts payment for earth excavation is per linear foot.

The sewer in Peachtree Ave. is in yellow and blue clay, underlain with shale. Depths vary from 24 to 35 ft. with 10 to 22 ft. cover. The half section at the right of the drawing



HALF-SECTIONS OF CONCRETE SEWERS IN LOUISVILLE

Left: 7⅞x11¾-ft. inverted egg; right: 60-in. circular in earth and in rock.

is of the 7⅞x11¼-ft. sewer. This and the 8⅛x12½-ft. sections have brick inverts; the 7½x11¼-ft. section has a plain invert. Grade varies from 0.26 to 0.33 per cent.

The 60-in. section of the Goss Ave. sewer runs along the south side of the south fork of Beagrass Creek on a grade of 0.50 per cent. Where the creek turns south it is crossed by two 10-in. vitrified-pipe sewers connecting the 60-in. sewer with the 54-in. section which continues to Goss Ave., and along the avenue connecting with the smaller sections. The 36-in. section slopes 2.15 to 2.41 per cent. The material is stiff yellow and red clay, with some blue clay and rock. Depth varies to 20 ft. In the vicinity of the creek the sewer extends above ground surface and earthfill is required to cover.

For the Peachtree Ave. sewer, fourteen bids were received, and unit prices are given of the lowest three: A, Fry & Kain, Lansing, Mich. (contract at $169,964); B, J. B. McCrary Eng. Corp., Atlanta; C, Thomas D. Nolan, Detroit.

For the Goss Ave. sewer, nine bids were received, and unit prices are given of the lowest two: A, George M. Eady Co., Louisville (contract $34,741); B, J. B. McCrary Eng. Corp., Atlanta.

TABLE I—PEACHTREE AVE. SEWER

	A	B	C
1,409.41 lin.ft. earth excav. and backfill	$9.75	$13.00	$10.00
508.59 lin.ft. earth excav. and backfill	15.00	18.00	12.00
1,120.34 lin.ft. earth excav. and backfill	9.75	12.50	9.00
836.66 lin.ft. earth excav. and backfill	9.75	12.00	8.00
850 cu.yd. rock excav., etc. (shale)	1.00	1.00	4.00
400 cu.yd. rock excav., etc. (limestone)	1.00	6.00	6.00
1,860 cu.yd. class "A" con. masonry	15.50	13.50	13.75
1,975 cu.yd. class "A" con. masonry	15.50	13.50	13.75
805 cu.yd. class "A" con. masonry	15.50	13.50	13.75
255 cu.yd. class "A" con. masonry	25.00	18.50	17.00
150 cu.yd. class "C" con. masonry	8.00	12.50	12.50
7 cu.yd. brick masonry	25.00	30.00	40.00
2,150 sq.yd. vit. brick lining of inverts	2.75	1.90	3.00
950,000 lb. steel reinf. bars	.031	.03	.0425
1,000 cu.yd. earth excav. below sewer	1.00	1.00	1.00
1,000 cu.yd. gravel refilling below sewer	2.75	2.75	2.75
24 in. and smaller A.S.T.M. clay sewer pipe ($2,373.80)	50%	50%	50%
27 in. and larger A.S.T.M. clay sewer pipe ($485.50)	50%	40%	45%
1,120 lin.ft. 6 in. laying with cement mortar	.20	.10	.50
1,000 lin.ft. 6 in. laying underdrain	.50	.25	.30
1,000 lin.ft. 8 in. laying underdrain	.60	.32	.40
1,000 lin.ft. 10 in. laying underdrain	.80	.42	.60
10 M. ft. B.M. sheeting, bracing, etc.	25.00	25.00	25.00
700 sq.yd. macadam pavement	1.40	2.25	1.35
Net total	$165,464	$165,129	$168,948
Progress and completion ($25.00 per day)	4,500	6,250	6,250
Gross total	$169,964	$171,379	$175,198
Number of days	180	250	250

TABLE II—GOSS AVE. SEWER

	A	B
Earth excavation and backfill (lump sum)	$160.00	$75.00
240 lin.ft. earth excav. and backfill	3.00	2.50
1,428.16 lin.ft. earth excavation and backfill	4.75	3.80
198.81 lin.ft. earth excavation and backfill	4.25	2.90
393± lin.ft. earth excavation and backfill	4.00	2.50
560 cu.yd. rock excavation, etc. (limestone)	7.00	6.50
77 cu.yd. class "A" concrete masonry	14.50	15.50
505 cu.yd. class "A" concrete masonry	14.50	15.50
61 cu.yd. class "A" concrete masonry	15.00	15.50
106 cu.yd. class "A" concrete masonry	15.00	15.50
52 cu.yd. class "A" concrete masonry	20.00	15.50
70 cu.yd. class "C" concrete masonry	12.00	15.50
4 cu.yd. brick masonry	25.00	35.00
139 sq.yd. vitrified brick lining of inverts	3.00	2.00
44,700 lb. steel reinforcing bars	.032	.035
100 cu.yd. earth excavation below sewer	1.00	1.00
100 cu.yd. gravel refilling below sewer	2.50	2.50
24 in. and smaller A.S.T.M. clay sewer pipe ($923.80)	55%	50%
27 in. and larger A.S.T.M. clay sewer pipe	45%	40%
140 lin.ft. 6 in. laying with plastic compound	.20	.30
500 lin.ft. 4 in. laying underdrain	.30	.20
1,000 lin.ft. 6 in. laying underdrain	.40	.25
3 M. ft. B.M. sheeting, bracing	25.00	25.00
241 sq.yd. W. B. macadam pavement	1.00	1.50
1,675 sq.yd. penetration asphalt macadam pavement (type B)	1.15	2.25
Net total	$32,491	$32,310
Progress and completion ($25.00 per day)	2,250	2,500
Gross total	$34,741	$34,810
Number of days	90	100

Temporary Bridge and Foundations for New Bridge Over Allegheny River

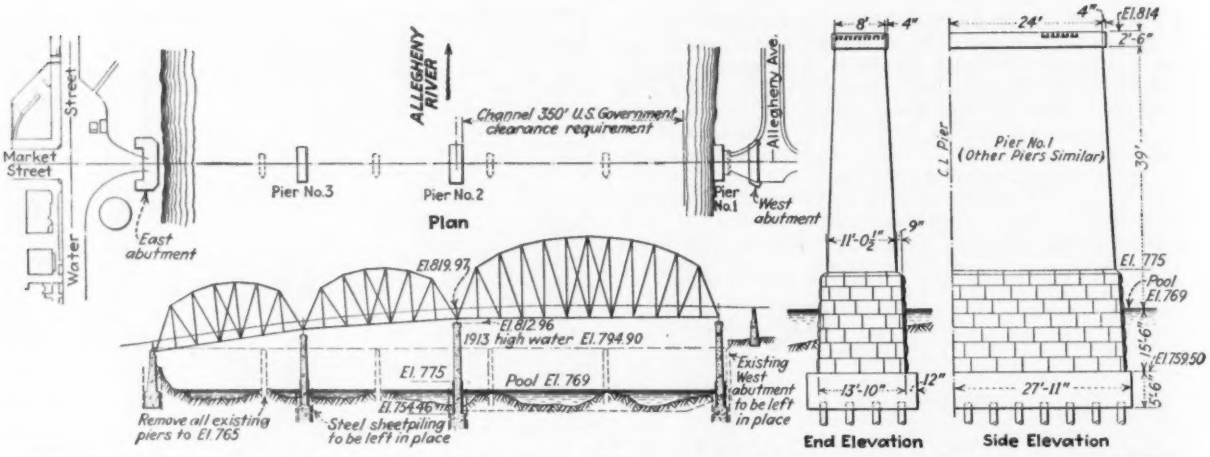
A NEW bridge will be built over the Allegheny River between Kittanning and Applewood boroughs, Pa., on the site of the present Market St. bridge. Contract for the foundations, awarded in October, 1930, calls for erection of two concrete abutments and three piers for the truss and plate-girder superstructure, and for removing the present truss superstructure and erecting it as a temporary bridge on new temporary foundations 135 ft. upstream. New approaches will connect the relocated bridge with the existing traveled road. These approaches will provide an 18-ft. driveway, which is to be covered with a 12-in. layer of slag, gravel or crushed stone, and an additional paved width of 5 ft. for pedestrians.

The contract price of $49,500 for the temporary bridge amounts to 22.4 per cent of the total contract price, and includes temporary foundations, moving the superstructure, including lighting system, and the approaches.

Excavation includes removal of existing foundations (class 2) except the abutment on the west bank of the river. Other class 2 excavation is material below pool El. 769 and consists of ½- to 2-ft. boulders, and sand and gravel with some boulders.

The foundations are to be built principally of class B concrete (1:2½:5) except for some class A (1:2:4) in the abutments and in the tubular pile footings. They are faced with ashlar, as shown in the drawing, and rest on concrete-

Unit Prices From Current Construction Bids



SUBSTRUCTURE PLAN OF NEW ALLEGHENY RIVER BRIDGE AT KITTANNING, PA., AND ELEVATION OF PIERS

Trusses of present bridge will be erected on new temporary foundations 135 ft. upstream, and later dismantled; piers of present bridge will be removed to El. 765, masonry 1,600 cu.yd. New stone-faced foundations contain 5,106 cu.yd. concrete and rest on steel tube piles.

filled steel-tube piles. Facing is of Pennsylvania sandstone or equal and varies in thickness from 2¼ to 2 ft. The piles are of ⅜-in. lap-welded mild steel 14 in. in diameter in 10-ft. lengths. All tubes for a footing are driven to bearing before any is filled. Each footing is completed in one pouring, which may proceed as soon as concrete in the tubes has taken initial set. Payment is for piles in place.

The department of highways lists as the minimum equipment it believes necessary for the work: two ¾-cu.yd. cranes, two pneumatic pilehammers and one drill, two compressors, two mixers, with a sufficient number of scows with stiff-leg derricks, and pumps.

The Foundation Co., New York, was awarded the contract at $221,093, and its prices are given. The quantities of materials are distributed in the foundation units as follows:

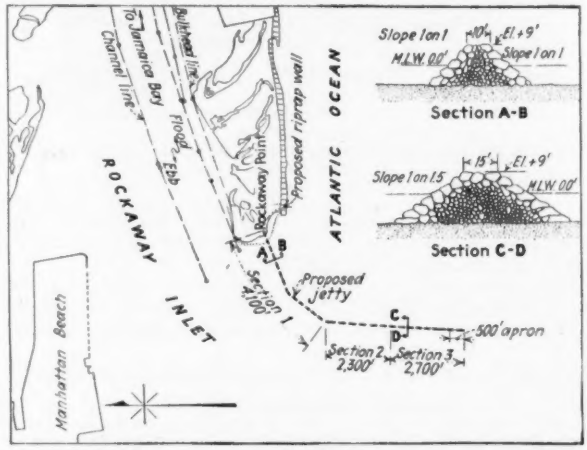
Item	East Ab'tm't	Pier 3	Pier 2	Pier 1	West Ab'tm't	Total
Class A conc., cu.yd.	53	.....	.....	.....	17	70
Class B conc., cu.yd.	1,315	890	1,282	1,079	540	5,106
Stone masonry, cu.yd.	.....	135	182	133	.....	450
Reinf. steel, lb.	19,070	15,694	19,920	18,068	7,048	79,800
6 in. vit. clay pipe, lin.ft.	110	.....	.....	.....	120	230
Stone backfill, cu.yd.	34	.....	.....	.....	26	60
2 in. galv. conduit, lin.ft.	34	.....	.....	.....	26	60
14 in. steel tubular piles, lin.ft.	3,240	1,960	2,800	2,280	.....	10,280
Excav., class 1, cu.yd.	.....	.....	.....	.....	.....	3,230
Excav., class 2, cu.yd.	.....	.....	.....	.....	.....	2,620
Piles, number	81	49	70	57	.....	257

3,230 cu.yd. class 1 excav.	$2.00
2,620 cu.yd. class 2 excav.	3.50
70 cu.yd. class A con.	35.00
5,106 cu.yd. class B con.	14.50
79,800 lb. plain steel bars	.045
60 cu.yd. stone backfill	5.00
230 lin.ft. 6-in. vitr. clay or plain cement con. pipe	1.50
10,280 lin.ft. 14-in. dia. con.-filled steel-tube piles	4.00
450 cu.yd. ashlar masonry	60.00
60 lin.ft. 2-in. dia. galv.-iron conduits	2.00
Temporary bridge	49,500.00
Maintenance temporary bridge	7,000.00
Total	$221,093

Riprap Jetty at Entrance to Jamaica Bay, N. Y.

A RIPRAP jetty 8,400 ft. long will be constructed at Rockaway Point, N. Y., at the entrance to Jamaica Bay. The work is in three sections, extending from the shore in successive lengths of 4,100, 2,300 and 2,700 ft. Section 3 includes an apron 4 ft. thick which will extend 500 ft. beyond the end of the jetty. Plan and typical cross-sections are shown herewith. Side slopes in Sec. 1 are 1:1; in the other sections 1:1½. The first 3,900 ft. has a top width of 10 ft., and 15 ft. for the remaining 4,500 ft. Height above m.l.w. is 7 ft. Soundings show 8 to 12 ft. of water.

A riprap wall 1,000 ft. long may be required along high-water shore line, connecting the shore end of the jetty with



LOCATION PLAN AND SECTIONS OF EAST JETTY, JAMAICA BAY, N. Y.

an existing privately owned bulkhead to the east. This wall will be 9 ft. above m.l.w., with ocean slope 1:1.5, land slope 1:1, top width 10 ft., and will contain 7,700 tons of riprap.

The core of the jetty is to be built of stone weighing not less than 135 lb. per cubic foot and consists of a graded mixture of quarry run ranging from 15 lb. to 6 tons. Slope and cap stone must weigh 160 lb. per cubic foot, angular pieces of at least 6 tons. Apron stone is same as for core, some 5,900 tons being required. Quantities for jetty and wall are 133,500 tons for core and 100,800 tons for slopes and cap. The site is exposed to storms and ocean currents. Mean tide range is 4.9 ft., spring tides 5.8 ft., maximum 8.5 ft.

Contract was awarded in November, 1930, to Merritt-Chapman & Scott Corp., New York. Contract price was $3.59 per net ton in place for all items except rehandling stone, which was $2. Col. G. M. Hoffman is U. S. district engineer.

CONSTRUCTION NEWS

Some of the Week's Large Projects

Location	Project	Cost	Status
Waterworks			
Ottawa (Ont.)	Water purification plant	$1,815,000	Bids asked
Sewers			
Muncie (Ind.)	Sewage disposal plant	1,000,000	Proposed
Bridge			
Chicago	Viaducts, bridges' Etc.	5,000,000	Bids asked
Excav. and Dredging			
East St. Louis (Ill.)	Dredging	1,900,000	Proposed
St. Louis	Drainage	1,000,000	Bids asked
Power and Lighting			
Evanston (Ill.)	Street lighting	1,438,000	Proposed
New York	Signal and interlocking equip.	2,178,000	Contract
Unclassified			
Illinois	Telephone improvements	3,000,000	Day labor
Philadelphia	Subway	4,431,847	Contract
Canada	Gas pipe line	20,000,000	Proposed
Federal Government			
Washington	Office	5,270,000	Contract
Quarry Hghts. (C. Z.)	Quarters	1,800,000	Contract
Factories and Mills			
Mobile	Paper mill	1,000,000	Proposed
Johnstown (Pa.)	Steel plant	3,000,000	Owner builds
Buildings			
New York	Apartment	1,250,000	Contract
New York	Apartment	1,750,000	Contract
Oklahoma City	Bank	3,000,000	Bids asked
Chicago	Club	1,500,000	Bids asked
East Cleveland	Hospital	1,000,000	Proposed
Toronto (Ont.)	Parliament	1,000,000	Owner builds
New Haven	University	2,500,000	Bids asked
Chicago	High school	1,500,000	Proposed
Oakland (Calif.)	Theatre	1,000,000	Contract
Washington	Theatre	1,000,000	Proposed
South Boston	Exposition	2,000,000	Day labor
Worcester (Mass.)	Memorial	2,000,000	Proposed

WATERWORKS

PROPOSED WORK

Ariz., Florence—Randolph Irrigation Dist., 34 complete pumping plants, wells, 136,000 lin.ft. gunite lined canals, laterals, 76 turnout structures, 35 culverts. $624,000 voted for same. Scott Eng. Co., Ellis Bldg., Phoenix, engrs.

Ariz., Octave—Red Bank Gold Placer Co., c/o Luhrs Bldg., Phoenix, 8.5 mi. pipe line operating under 1,800 head for hydraulic sluicing. J. B. Ehrhart, mgr.

Ariz., Phoenix—Camelback Water Conservation Dist., E. E. Young, secy., eight 20 in. deep wells with deep well turbine pumps and 150 hp. motors; 8 mi. 11,000 volt transmission line; 100,300 lin.ft. 12- to 24-in. plain and rein.-con. pipe; 12,540 lin.ft. 10 and 12 in. steel welded pipe; two 50,000 gal. reservoirs. Reed & Baker, Fleming Bldg., Phoenix, engrs. $516,000 voted for same.

Calif., Glendale—For one 11 m.g. and one 19 m.g.c.p. reservoirs, reinforced retaining wall, 22 ft. deep with concrete roof designed for 250 lb. load. P. Diederich, 119 North Glendale Ave., engr. Noted May 29.

Calif., Redwood City—Surveys pipe line to connect city water system with Canine Property wells. $17,500. C. L. Dimmitt, city engr.

Conn., Colchester—Town, A. T. Van Cleve, chn. com., waterworks. $15,000 or more.

Conn., East Hartford (br. Hartford)—Town, dam. $20,000. Appropriation made to make soundings and engage engineer for future construction of dam. Engineer not selected.

Ind., Spiceland — Town retained Municipal Eng. Co., engrs., Plainfield, to prepare plans waterworks. $35,000. R. Griffin, chn. town bd.

Mass., Clinton—Town, T. Fallon, pumping station and pipe line at Metropolitan Reservoir. $60,000. Engineer not selected.

Mass., Winthrop (br. Boston)—Town. Bd. Selectmen, waterworks in Revere St. $45,000 appropriated.

Minn., Hoffman—City, A. Sutton, mayor, preliminary plans waterworks. W. E. Buell & Co., Insurance Exch. Bldg., Sioux City, Ia., engrs.

N. J., Point Pleasant—Bd. Boro Council, Boro Hall, waterworks. $15,000. Engineer not selected.

N. J., Wayne — Township Com., Municipal Bldg., waterworks. $15,000. Engineer not selected.

N. Y., Brooklyn—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., New York, soon takes bids 2 story water pumping station, Neptune Ave. and Bay View St. $150,000. D. M. Metcalfe, Huntington, engr. and archt. Noted Nov. 27.

O., Garfield Heights—City, sketches 750,000 gal. water tank and centrifugal pump. $60,000. R. Munz, city engr.

Okla., El Reno—Preliminary plans main extensions. $15,000. J. H. Bender, El Reno, engr.

Okla., Sayre—Preliminary plans main extensions. $30,000. O. Speed, mayor.

Pa., Derry—Westmoreland Water Co., Greensburg, subsidiary Community Water Serv. Co., P. S. Wilson, supt. operation. 46 Cedar St., New York, concrete sedimentation beds, filtration plant. D. C. Morrow, c/o Citizens Water Co., Washington, engr. **Maturity in February.**

Tex., Dalhart — West Texas Utilities Co., Abilene, 3 extensions to present waterworks, incl. 8,000 ft. c.i. welded pipe. Private plans.

Tex., Dumas — West Texas Utilities Co., Abilene, improving waterworks, incl., 5,400 ft. 2 in. mains and 2 in. c.i. screw joint pipe. $30,000. Private plans.

Tex., El Paso — For 40 m.g. reservoir on mesa at north end Brown St. $310,000. Address R. E. Thomason, mayor

Tex., Sierra Blanca—Heath, Schlessman & Co., U. S. Natl. Bank Bldg., Denver, Colo., soon takes bids complete waterworks and sewerage systems. J. S. Barlow, 830 Wilson Bldg., Dallas, engr.

Tex., Yoakum—City waterworks plant, incl. large distributing system, reservoir, pumping unit. $300,000. Montgomery & Ward, Wichita Falls (tentatively selected), engrs.

Utah, Delta—H. Joseph, Regent Bldg., Salt Lake City, applied for franchise and plans waterworks. $300,000. Engineer not selected.

Utah, Salt Lake City—Watermain extensions. $84,000. H. Jessen, city engr.

Wyo., Casper — Improving waterworks. $22,000 available.

Ont., Alexandria—Town, extending waterworks, incl. 7 in. c.i. mains, centrifugal pumping equipment. $20,000. W. H. Magwood, Cornwall, engr. Noted Nov. 13.

Ont., Burlington—Town, extending 4,500 ft. 8 and 10 in. c.i. watermains in Birch and Hurd Aves. $18,000. G. H. Power, Burlington, engr.

Ont., Fort Frances—Town, 48 in. steel intake from Rainy Lake to pumphouse. $50,000. D. J. Gillon, Fort Frances, engr.

Ont., Fort William—For 1 mi. 12 in. c.i. cross connection between mains on Franklin and Hardesty Sts. $23,000. C. B. Symes, City Hall, engr.

Ont., Lakefield — Village waterworks, incl. mains, pumps, hydrants, valves, etc. $50,000.

Ont., Newmarket—Town extending 1 mi. 6 in. mains. $16,000. James, Proctor & Redfern, 36 Toronto St., Toronto, engrs.

Ont., Ottawa—Watermains. $35,000. A. F. Macallum, city engr.

Ont., Sudbury—City Council, 1 mi. 6 in. mains in Morris St. $20,185. W. McMullen Mackie Blk., engr.

BIDS ASKED

Calif., San Diego—See "Streets and Roads."

Calif., San Francisco — Dec. 17, by S. J. Hester, secy. Bd. P. Wks., furnishing, installing electrically driven centrifugal pump at Mills Municipal Airport. $4,000.

Ill., Chicago—Dec. 16, at office Bd. Local Impvts., City Hall, c.i. water supply pipe, necessary castings, c.i. fire hydrants, c.i. valves, brick valve basins in East 98th Pl., East 87th, 98th, West 97th, Nelson and South La Salle Sts., Marquette, North New Castle, North Cicero, Howard, Princeton, Yale, Perry and Lafayette Aves. M. J. Faherty, pres.

Mass., Hanson — Town, Water Comrs., G. Bowker, chn., taking bids extending mains. $85,000. Noted Nov. 13.

Mo., Clarkton—Dec. 16, by City Clerk, 50,000 gal. tank on tower, 10 in. 50 ft. well, 12 x 12 ft. pump house, vertical pump and motor, chlorinator, 12,200 lin.ft. 4 and 6 in. c.i. pipe, 2¼ tons special c.i. castings; 12 gate valves, 17 fire hydrants, 500 ft. fire hose. $20,000. W. A. Fuller Co., 2016 Shenandoah Ave., St. Louis, engr. Noted Nov. 27.

Md., Curtis Bay (sta. Baltimore)—Dec. 17, by Bd. Awards, Baltimore, tank masonry, brick, granite, terra cotta, cut stone, bronze tablet, Montevedeo and Prudence Sts. E. G. Rost, Municipal Bldg., Baltimore, water engr.

Va., Fairfax—See "Contracts Awarded."

B. C., North Vancouver—Dec. 15, by Y. S. Hanes, engr., City Hall, 5,000 ft. in., 7,600 ft. 6 in. inside diam. c.i. pipe, 14,000 lb. pig lead.

Ont., Ottawa—Dec. 23, by City, N. H. H. Lett, clk., City Hall, superstructure water purification plant on Lemieux Island; Jan. 6, furnishing, installing equipment, appurtenances for same. Total $1,815,000. Gore, Nasmith & Storrie, Confederation Life Bldg., Toronto, engrs. A. F. Macallum, city engr. Noted Apr. 3.

CONTRACTS AWARDED

Ind., Delphi—T. R. Arnold, city clk., c.i. aqueduct from springs east of here to reservoirs at pumping station, to Frank Stewart, Inc., Indianapolis, $27,464. Est. $30,000. Noted Nov. 20.

Ind., Valparaiso—City, repairs and additions to filter system and pumping stations, to International Filter Co., 333 West 25th Pl., Chicago, Ill., $17,643.

See proposal advertising on page 109

Constr. News page 237

LEADITE

Trade Mark Registered U.S. Pat. Office

—is Nationally used and liked

No matter where you may travel in this Country and its possessions,—also Mexico, South America, Central America, and in many Overseas Countries, —you will find bell and spigot water pipe lines jointed with LEADITE.

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Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Tile Building - - Philadelphia, Pa.

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Waterworks (Continued)

Kan., Topeka—Water storage reservoir, pump house, to P. M. Spencer & Son, 1805 Harrison St., $119,500.

La., Clinton — Bd. Aldermen, elevated steel tank, tower ,to Chicago Bridge & Iron Wks., Magnolia Bldg., Dallas, Tex., $2,845; concrete reservoir, mass concrete foundation, pump houses, to R. Decell, Cheneyville, $2,950; pipes and valves, to Dixie Mill Supply Co., 901 Tchoupitaulas St., New Orleans, $7,900; service and fire pumps, to Fairbanks-Morse Co., 1000 St. Charles St., New Orleans, $1,244; well, to Gray Artesian Well Co., Pensacola, Fla., $984. Grand total $15,923. Noted Nov. 20.

Mass., Fall River—City, Auditors Office, City Hall, steel tank, Emmett St., to Pittsburgh-Des Moines Steel Co., 50 Church St., New York, $14,200. Est. $20,000. Noted Nov. 13.

Mass., Westboro—Dpt. Mental Diseases, Commonwealth of Massachusetts, State House, Boston, brick pumping station at Westboro State Hospital, to T. A. Cassidy, 54 Boylston St., Fitchburg. Est. $25,000. Noted Nov. 24.

Neb., Rushville—City, turbine, pump, motors, to Layne-Western Co., 405 East 13th St., Kansas City, Mo., $5,750. Noted Nov. 13.

N. Y., Long Island City—J. J. Dietz, comr., Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 50th St., to S. Gallucci, 33 Railroad Ave., Corona, $7,247. Noted Nov. 20.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Arlington Ave., to Knidem Constr. Co., 4197 Park Ave., $5,840. Noted Nov. 20.

Okla., Wetumka—W. H. Burkes, city clk., new impounding reservoir, dam, spillway, bridge, intake, pump station, 9,000 ft. 8 in. c.i. pipe line, 38,000 cu.yd. excav., to Pharoah & Co., Inc., Henryetta, $54,421. Est. $65,000. Noted Dec. 4.

Pa., Phila.—Dpt. P. Wks., Bureau of Water, A. Murdock, dir., City Hall Annex, furnishing, laying 6 and 12 in .pipe in Manayunk, Contr. 1000, and laying high pressure pipe, Contr. 1011, to P. and A. J. Ellis, 4th and Wyoming Sts., $34,356 and $26,630 respectively; furnishing, installing railroad siding at Lardners Point, Contr. 1005, to F. Curtis, 6736 State Rd., $4,700; furnishing, laying 6, 8 and 12 in. c.i. pipe in various streets, etc., Contr. 1006, to M. and J. B. McHugh, 892 North Mackoe St., $108,718; furnishing, delivering 500 Philadelphia Standard fire hydrants, 500 flangs removable pipe rapid service fire hydrants with service hydrant tops, Contr. 1008, and furnishing, delivering 150 tons 8 in. bends and reducers, 4 tons valves, 4 tons 8 in. flanged tees, Contr. 1010, to A. P. Smith Mfg. Co., 545 North Arlington Ave., East Orange, N. J., $71,425 and $3,800 respectively. Grand total $249,720. Noted Nov. 6.

Tex., Waxahachie — City, c/o T. Cheatham, mayor, waterworks improvements, incl. drilling 3,000 ft. water well, with c.i. welded pipe, laying new mains, to Prince Bros. Drilling Co., Waxahachie, $25,917. Will purchase pump 3 months after completion project. Noted Oct. 9.

Va., Fairfax—Town Council, installing new waterworks, using centrifugal pipe, to McCrary Eng. Co., Citizens & Savings Bank Bldg., Atlanta, Ga., $45,000. Town will take bids for materials and open same about Dec. 15.

SEWERS

PROPOSED WORK

Calif., Santa Maria—Surveys sewerage system extension. $25,000. Y. Peterson, city engr.

Ill., Woodstock—Village, sewage treatment plant. $100,000. Suhr, Berryman, Peterson & Suhr, 134 North Wells St., engrs.

Ind., Muncie—State Bd. Health sewage disposal plant. $1,000,000.

Mass., Saugus—Town, Bd. Selectmen, sewer and drain improvements. $31,000 appropriated.

Mich., Muskegon Heights — City soon takes bids sewage treatment plant. $125,000. Suhr, Berryman, Peterson & Suhr, 134 North Wells St., Chicago, Ill., engrs.

Mich., Birmingham—Village, 8,000 ft. 8- to 54-in. concrete or vitr. sewer, manholes, connections, etc., and outlet into open ditch, East Birmingham Drain east of Eton Rd. $185,000. H. H. Carson, village engr.

Minn., Marshall—City sewage disposal plant. W. E. Buell & Co., Insurance Exch., Sioux City, Ia., engrs.

Mo., Kansas City—City soon takes bids 8 ft. storm sewer in Gilham Rd. from 39th to 43rd Sts. $140,000. R. Waddell, city engr.

N. J., Burlington—Mayor and Council sewage disposal plant. $150,000.

N. J., Keyport — Enlarging sewage disposal system. H. Roberts, Keyport, engr.

N. J., Paterson—Bd. P. Wks., City Hall, preliminary plans storm and industrial sewers in West Parkway, Sherman and Sheridan Aves., Wood, Lowe, Keep and North Straight Sts. $100,000. H. J. Harder, city engr.

Okla., Sayre—Preliminary plans sanitary sewer extensions. $40,000. O. Speed, mayor.

Okla., Wynnewood — Preliminary plans sanitary sewer extensions. $25,000. J. Y. Wheeler, Wynnewood, engr.

Tex., Sierra Blanca—See "Waterworks."

Tex., Waco—Surveys 42 in. storm sewers 12 blocks Jefferson St. $35,000. J. H. Strange, city engr.

Utah, Salt Lake City—Storm sewer for north and east sections. $400,000. H. Jessen, city engr.

Ont., Copper Cliff—Town, 8 in. and up. Vitr. clay storm and sanitary sewers. $100,000. T. D. Price, Copper Cliff, engr.

Ont., Ft. William—City, 2 mi. 12-24 in. tile sewers in Mountain, Broadway, Center, Euclid and Wallbridge Aves., Gore and McVicar Sts. $49,300. C. B. Symes, City Hall, engr.

Ont., Galt—City, 1 mi. 8 in. and up storm and sanitary sewers. $25,000. D. T. Black, City Hall, engr.

Ont., Grimsby—Town, 1 mi. 8 in. and up. vitr. tile sewers in Livingstone Ave. Dist. $30,000. F. A. Dallyn & Co., 71 King St. W., Toronto, engrs.

Ont., Hamilton—For 1½ mi. 8 in. and up vitr. clay sewers in Concession St. $56,680. W. L. McFaul, City Hall, engr.

Ont., Hanover—Town, extending 1½ mi. 8 in. and up vitr. clay tile storm and sanitary sewers. $40,000. C. R. Hagey, Queen St., Fort Erie, engr.

Ont., Kitchener—City, 8,600 ft. 8 in. and up rein.-con. and vitr. clay sewers. $25,000. S. Shupe, City Hall, engr.

Ont., Lindsay—F. A. Dallyn & Co., consult. engrs., 71 King St. W., Toronto, preparing plans sewage disposal plant, incl. pumping station, pumps, force main, river crossing, concrete tanks, etc. $106,000. O. Smith, Lindsay, town engr.

Ont., North Bay — City Council rein.-con. modern sewage disposal plant, probably activated sludge type. $50,000 or more. F. G. Mackie, City Hall, engr.

Ont., Orillia—Town, 3 mi. 8 in. and up sanitary sewers. $52,000. R. Starr, Orillia, engr.

Ont., Port Arthur—For 3 mi. 8 in. and up vitr. clay sewers. $100,000-$150,000. J. A. Antonisen, City Hall, engr.

Ont., Sandwich—Town, 2 mi. 8 in. and up vitr. clay storm and sanitary sewers in California, Huron, King and Queen Sts., Partington Ave. and Church Line. $74,000. C. R. McCall, 56 Pitt St., Windsor, engr.

Ont., Sudbury—For ¼ mi. 18 in. sanitary sewers in Worthington, Crescent, Riverside St. to Junction Creek. $31,480. W. McMullen, Mackie Blk., engr.

Ont., Sudbury—City, ¼ mi. vitr. tile sanitary sewers from intersection of Hickory and Regent Sts. to Pine and Ethelbert Sts. $27,310. W. McMullan, Mackie Blk., engr.

Ont., Toronto—East York Twp., Rosemount Heights Trunk Sewer, incl. 1¼ mi. concrete pipe. $109,000. Wynne-Roberts, Son & McLean, Metropolitan Bldg., engrs. G. R. Jack, 443 Sammon Ave., Toronto, twp. engr.

BIDS ASKED

Calif., San Diego—See "Streets and Roads."

Conn., Middletown—Dec. 19, by City, sewerage system, in Durant Dist., incl. laying 15,000 ft. pipe. $50,000-$75,000. G. A. Schaefer, City Hall, engr. Noted Nov. 20.

Fla., Miami—Dec. 22, by City Comn., City Hall, manholes, concrete, vitr. sewers in Sanitary Sewer Impvt. Dist. 277, Northwest 1st Ave. from north property line of Lot 19, Block 2, High School Park Tract Subdivision to connection with existing sanitary sewer in Northwest 60th St.; Sanitary Sewer Impvt. Dist. 278, Southwest 5th St. from Southwest 19th Ave. to Southwest 22nd Ave. H. E. Roscoe, city clk.

Kan., Wichita—Dec. 22, by C. C. Ellis, city clk., mechanical equipment for complete disposal plant. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

La., Baton Rouge—Dec. 16, by Comn. Council, 102,900 ft. 8- to 15-in. terra cotta sewers, 100 ft. c.i. pipe, 11,540 ft. 18- to 24-in. terra cotta or c.i. pipe, 340 manholes, 900 ft. extra depth manholes, 140 band flush tanks, 320 ft. 78 in. manhole drops, 15 ft. 10 in. manhole drops, 2,820 wyes, 340 terra cotta tee branches, 40,000 ft. 6 in. terra cotta service pipe, 1,000 ft. ¾ in. galvanized extra length pipe serving flush tanks. $290,000. L. J. Voorhies, City Hall, engr.

Md., Baltimore—Dec. 17, by Bd. Awards, furnishing, delivering manhole frame and covers, sewer inlet, similar iron castings, Material Contr. 82, to Bureau Sewers. M. J. Ruark, Municipal Bldg., sewerage engr.

Mass., Boston—Dec. 17, Dpt. P. Wks., sewerage works in Brighton, Hyde Park and West Roxbury. $25,000. J. A. Rourke, Dpt. P. Wks., comr.

Mass., Boston—Dec. 18, by Metropolitan Dist. Comn., 5,200 ft. 48 in. x 51 in. concrete sewer, 5,000 cu.yd. concrete, 25 cu.yd. brick and 200 cu.yd. boulder concrete masonry, portland cement, 300 cu.yd. rock excav., siphon and special structures, Sect. 116 New Neponset Valley Sewer, South Metropolitan System, in Canton and Norwood, for Metropolitan Dist. Comn.

N. Y., Brentwood—Dec. 30, by Dpt. Mental Hygiene, State Office Bldg., Albany, sewage disposal system, at Pilgrim State Hospital, Suffolk Co.; adv. E. N.-R. Dec. 11.

N. Y., Buffalo—Dec. 18, by G. Fisk, comr. P. Wks., Municipal Bldg., 12 in. vitr. tile sewer in Buffam Blvd.; 12 and 18 in. in Fields Ave.; 10- to 15-in. in Hastings Ave.; 10 in. in west side Montgomery St.; extending sewer in Tamarack St. W. Rathman, city engr.

N. Y., New York—Dec. 16, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Middletown Rd., Spencer and Radio Drs., Dwight, Robertson, McDonough and Kennellworth Pls., Ampere, Ohm, and Watt Aves.

N. Y., New York—Dec. 17, by J. Miller, pres. Manhattan Boro, Municipal Bldg., altering and improving sewer in Mercer St. from West Houston to Bleecker Sts.

Okla., Kingfisher—Bids about Dec. 15, sewage disposal plant. $25,000. Milliken & Whiteneck, Majestic Bldg., Oklahoma City, engrs. Noted Sept. 4.

Pa., Phila. — Dec. 17, by Dpt. P. Wks., Bureau Eng. & Surveys, A. Murdock, dir., City Hall Annex, Schedule A, branch sewers in Elmwood, Loretta and Tyson Aves., Ashdale, Belgrade, Wilmot, Callowhill, Champlost, 4th, Lawndale, Levick, Longshore, 19th, Pechin, Pickering and 7th Sts.; Schedule B, sewage disposal project, dredging, Frankfort Creek between Church and St. Paul Sts. J. H. Neeson, ch. of Bureau.

Tex., Refugio—Dec. 16, by City, c/o J. O. West, mayor, disposal plant, sewerage system, $60,000. Hawley, Freese & Nichols, 303 1st Natl. Bank Bldg., San Antonio, engrs.

Wis., Milwaukee — Dec. 19, by Sewerage Comn., furnishing, fabricating, delivering conveyor system in extension to Dryer House, $50,000. J. L. Ferebee, city engr.

Ont., Fort Erie—See "Contracts Awarded."

Ont., Kitchener—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Redondo Beach—C. C. Mangold, city clk., extending sewerage system, incl. 8 and 12 in. Vitro-Dur pipe, to Chutuk, Kordich & Vukojevich, 3518 Percy St., Los Angeles, $25,800. Noted Nov. 13.

Calif., San Diego—City, 3,823 ft. 24 in. c.i. pipe, new outfall sewer, 2 manholes, Fisher St. from 32nd St. to pier head line in San Diego Bay, to F. Doran, 3733 37th St., $29,900.

Ill., Chicago—Bd. Local Impvts., City Hall, system brick, tile sewers, brick manholes, catch basins in West 75th, 76th, 77th and 78th Places, West 75th, 76th, 77th and 78th Sts., South St. Louis, South Sawyer, South Spaulding, Turner, Homan, South Trumbull and South Central Park Aves., to E. Till, 5475 Hirsch St., $84,060. Noted Nov. 27.

Md., Baltimore—Bd. Awards, sanitary sewers and storm drains, in Storm Water Contr. 161, to D. C. McAleer, Lexington Bldg., $40,736. Noted Nov. 20.

Mass., Norfolk—State Prison Colony, 6,000 ft. 12 in. outfall and 2,200 ft. 10 in. trunk sewers, to D. DiPietro, Bellingham, $18,904. Est. $25,000. Noted Nov. 13.

Mich., Detroit — Dpt. P. Wks., 24 in. concrete lateral sewer, brick, concrete manholes in Five Points, Winston and Grand Aves. from Seven Mile Rd. to Frisbee Ave., to Ianni Constr. Co., 2237 St. Joseph Ave., $25,000; constructing Puritan-Telegraph pumping station and sewer outlet, to F. O'Kray, 6138 Epworth Blvd., $8,695. Noted Nov. 6.

Mont., Great Falls—Reconstructing sanitary sewer in 3rd St. between Park Dr. and 1st alley N. to McGuire & Blakesley, Great Falls, $36,857. Noted Mar. 27.

Neb., Lincoln—City, Storm Sewer Project 1A, to R. O. Stake, 145 South 28th St., Lincoln, $38,500; Sewer Dist. 337, to G. L. Vlasnik, 1721 22nd St., $2,452.

Neb., Omaha—Storm Sewer 1080 in 22nd St., to Gavenman Friedel Constr. Co., 1611 South 53rd St., $41,506. Noted Nov. 19.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., sewers in Farmers Blvd., to A. Clemente, 1193 Spofford Ave., New York, $10,006. Noted Nov. 20.

O., Bexley (mail Columbus) — Village and City of Columbus, storm sewer in Gould Rd., to N. Cinci, 1381 Essex Ave., Columbus, $103,362.

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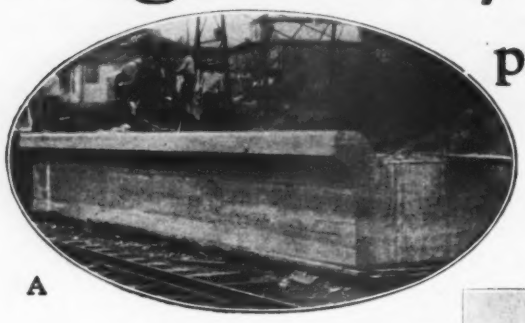
High-early-strength . . .

precast slabs ready for placing on bridge in 4 days



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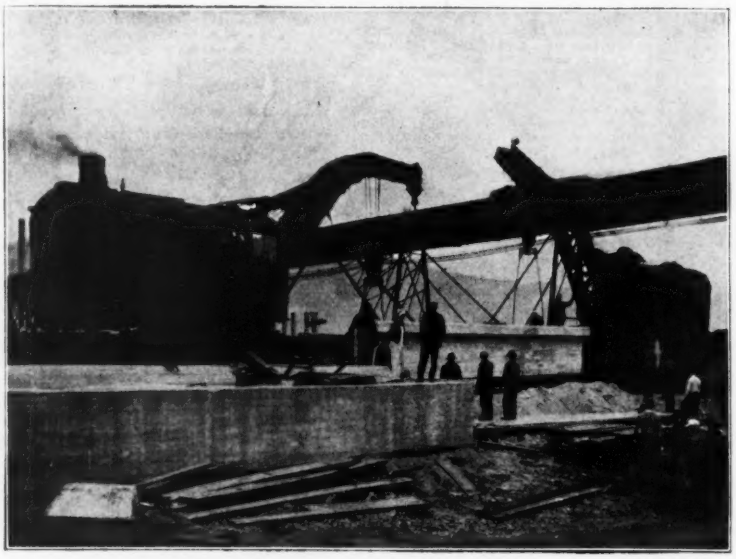


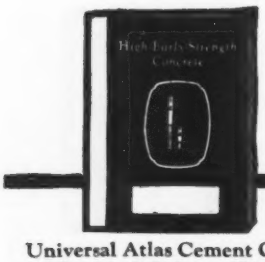
High-early-strength concrete slabs, made with Universal Atlas methods and cement, for the replacement of an old Pennsylvania Railroad bridge at Martins Ferry, W. Va. S. E. Holland, division engineer, in charge of construction.

(a) Completed slab of precast concrete ready for placing.

(b) Crane raising slabs into position.

TWO 70-ton slabs of high-early-strength concrete made with Universal Atlas methods and cement were ready for service on a Pennsylvania Railroad bridge 4 days after the concrete was placed. With concrete made by ordinary methods of mixing and placing, the time required for the slabs to reach the desired strength would have been from 2 to 3 weeks.

Placing the slabs in position on the new bridge interrupted service on the division only three hours.



Detailed methods for securing high-early-strength concrete with the same Universal Atlas standard portland cement as is supplied for regular work will be furnished on request. Just use the coupon.

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Without obligation, please send me booklet giving full details for securing high-early-strength concrete with Universal Atlas methods and cement.

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OFFICES IN: Chicago, New York, Philadelphia, Boston, Newark, Albany, Pittsburgh, Cleveland, Columbus, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Omaha, Oklahoma City, Birmingham and Waco.

Sewers (Continued)

O., Cleveland—Sewers in Kinsman Rd. from East 93rd St. to Kingsbury Rd., to Moorhead & Mutillo, 1343 East 120th St., $7,522; Kinsman Rd. from East 116th St. to East 149th St., Contrs. 1 and 2, to Joseph Kalill & Jackson, 13011 Triskett Rd., $248,834 and $139,067 respectively. Grand total $395,423.

Tenn., Knoxville — W. W. Mynatt, dir. P. Wks., Broadway Sewer Lateral 1, incl. 39,000 ft. 6- to 12-in. pipe, to L. A. Gridley, Wray Ave., $64,923. Est. $75,000. Noted Nov. 27.

Tex., Fort Worth—City, c/o O. E. Carr, city mgr., storm sewer in South Main St. and Jennings Ave., to Tarrant Constr. Co., 1005 North Calhoun St., $46,880.

Tex., Goose Creek—City, c/o R. M. Maley, city mgr., complete standard Globe type disposal plant, to Globe Sewage Degasifying Co., Esperson Bldg., Houston, $15,900.

Wis., Milwaukee—Sewerage Comn., furnishing, setting brick for 3 dryers and 3 stokers, to A. C. Guetzkow, Inc., 5410 State St., $20,774.

Ont., Fort Erie—Town, 36 in. trunk sewer in Niagara Blvd., day labor, under supervision M. E. Gray, town engr. $37,000.

Ont., Hanover—Town, extending sewers, to W. E. Taylor Co., Hanover; 15- to 24-in. concrete pipe, to J. E. Russell Co., Hanover. Est. $50,000. Noted Nov. 13.

Ont., Kitchener—For 8,600 ft. 8 in. and up rein.-con., vitr. tile sewers, day labor, $25,000. S. Shupe, City Hall, engr. Noted Dec. 4.

WASTE DISPOSAL

CONTRACTS AWARDED

O., Lakewood—City, E. R. Wiegand, dir. P. Wks., City Hall, 1 story, garbage incinerator, brick, steel, concrete, Berea Rd., to Pittsburgh-Des Moines Incinerator Co., Pittsburgh, Pa. $74,400. Noted Nov. 6.

BRIDGES

PROPOSED WORK

Idaho, Dover — State Bd. P. Wks., Boise, bridge over Pend Oreille River, near here. $750,000. J. D. Wood, comr.

Ind., Vincennes—State Hy. Comn., Indianapolis, 7 span rein.-con. arch bridge, Knox Co. W. J. Titus, ch. engr.

Ia., Waterloo — For 758 ft. concrete, steel bridge to have four 150 ft. 8 panel river spans, 4 approach spans, 7 in. concrete floor with upper ½ in. specifically treated for wear, two 5 ft. sidewalks, at 18th St. $104,397. N. Barber, City Hall, engr. Hall & Marsh Eng. Co., 205 Masonic Temple Bldg., Des Moines, consult. engr.

Okla., Minco—State Hy. Dpt., Oklahoma City, preliminary plans 4 span 96 ft. rein.-con. bridge over Devils Canyon, Grady Co. $30,000. A. R. Losh, ch. engr.

Pa., Butler—Bd. Comrs. Butler Co. probably take bids early in January, steel, concrete bridge over Connoquenessing Creek at Kittaning St. $50,000. J. Farris, Empire Bldg., Pittsburgh, engr.

Va., Richmond — Bd. Aldermen, expending $50,000, improving 9th St. traffic bridge, incl. replacement ¼ of floor, defective buckle plates, constructing guard rails.

Ont., Sandwich—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

BIDS ASKED

D. C., Wash.—Jan. 5, by Dist. Comrs., District Bldg., reconstructing Monroe St. Bridge over Baltimore & Ohio R.R.; adv. E. N.-R. Dec. 11.

Ill., Chicago—Dec. 22, at office Bd. Local Impvts., City Hall, Ogden Ave. Improvement, incl. filled approaches, viaducts, river and canal bridges. $5,000,000. M. J. Faherty, pres.

Ind., Evansville — Dec. 16, by Bd. Comrs. Vanderburgh Co., on new plans bridge over Pigeon Creek, at West Franklin St. $175,000. Former contract rescinded. S. B. Bell, Evansville, aud. Noted Sept. 25.

Mass., Revere—Dec. 16, by Dpt. P. Wks., State House, Boston, 4,500 ft. steel, concrete bridge, bituminous macadam approaches. A. W. Dean, Dpt. P. Wks., Boston, engr.

Missouri—Dec. 19, by State Hy. Dpt., Jefferson City, bridges in Barton, Clay, Dade, Gasconade, Greene, Lawrence, Mississippi, Newton, Nodaway and Ripley Counties. T. H. Cutler, ch. engr.

New Jersey — Dec. 10, by Bd. Freeholders Morris Co. (Morristown) and Somerset Co. (Somerville) 3 span encased I-beam bridge on Valley Rd., West Millington. $25,000. H. Hopkins, Morristown, engr. former, and S. O. Smith, Somerville, engr. latter counties.

New Jersey—Dec. 29, by State Hy. Comn., Trenton, single leaf, simple trunnion, bascule span bridge with short creosoted timber trestles, approaches across Delaware & Raritan Canal, Route 26, Sects. 1 and 2, Baker's Basin, Mercer Co. A. L. Grover, ch. clk.; adv. E. N.-R. Dec. 11.

Ohio—Dec. 23, by R. N. Waid, dir. hys., Columbus, 2 concrete bridges on Sect. "N" Dayton-Chillicothe Rd., Greene Co., $24,218—extending present 40 ft. spandrel filled arch bridge to 66 ft., 10 in. between curbs, $10,920, also concrete beam bridge Sect. "N" Cincinnati-Batavia Rd., $10,475, both Hamilton Co.—4 span steel girder bridge, Sect. "Painesville Bridge" Wickliffe-Madison Rd., Lake Co., $48,309.

Pa., Kittanning—Dec. 18, by State Hy. Dpt., Capitol Bldg., Harrisburg, 946 ft. truss and plate girder superstructure, incl. 3 thru truss and 1 deck girder spans, Market St. $800,000. S. Eckels, Capitol Bldg., Harrisburg, engr. T. C. Frame, 502 Franklin Trust Bldg., Franklin, div. engr. Noted July 31.

CONTRACTS AWARDED

Calif., Manzanita—C. H. Purcell, engr. State Hy. Comn., Sacramento, bridge to have 56 ft. plate girder span on concrete piers with pile founds., 45 ft. steel stringer span on concrete bents with pile founds., 2,340 ft. timber trestle on pile and frame bents over Richardson Bay and Northwestern Pacific R.R., Marin Co., here, to Healy-Tibbets Constr. Co., 64 Pine St., San Francisco, $329,668. Noted Nov. 13.

Calif., San Diego—See "Streets and Roads."

Georgia — State Hy. Dpt., East Point, 3 bridges on Lexington-Washington Rd. between Lexington and Wilkes Co. line, to J. B. McCrary Eng. Corp., Citizens & Southern Bank Bldg., Atlanta, $30,434. Est. $30,000.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bridges in Will Co., to Milwaukee Bridge Co., 410 34th St., Milwaukee, Wis., $48,836—Bond Co., to S. G. Cool Co., 130 North Wells St., Chicago, $46,670—Cook Co., M. J. McDermott & Co., Chicago, Ill., $136,710. Grand total $232,216. Noted Aug. 28.

Minn., Henderson — F. Hoopenstedt, aud. Sibley Co., Gaylord, three 140 ft. steel truss span bridge over Minnesota River, on Minn. Trunk Hy. 14, for Sibley Co. (Gaylord) and Le Sueur Co. (Le Sueur Center), to Nolan Bros. & Erler, 18 North 2nd St., Minneapolis, $48,143. Noted Oct. 23.

O., Warren—Bd. Comrs. Trumbull Co., bridge improvements, incl. new brick paving, guniting, concrete railing, sidewalks, to Wertz Co., Union Trust Bldg., Cleveland, $24,862. Noted Nov. 27.

S. D., Sioux Falls—Chicago, Milwaukee, St. Paul & Pacific R.R. Co., C. F. Loweth, ch. engr., Union Sta., Chicago, Ill., concrete central pier for new plate girder bridge over Sioux River near 8th St. to Sioux Falls Constr. Co., Sioux Falls. Est. $100,000.

Tennessee—State Dpt Hys. & P. Wks., Nashville, to Whiting-Turner Constr. Co., Stewart Bldg., Baltimore, Md., concrete, steel bridges over French Broad River near Bridgeport, Cocke Co. $111,462; over Cumberland River near Ft. Blount, Jackson Co. $185,385; over Caney Fork River between Carthage and Elmwood, Smith Co. $147,932—to T. A. Loving & Co., Goldsboro, N. C., over Watauga River between Johnson City and Bluff City, Washington Co., $94,877—to Southern Constr. Co., 615 South 11th St., Birmingham, Ala., over Cumberland River near Gallatin, Wilson and Sumner Counties, $201,860. Grand total $741,516. Noted Nov. 6.

Texas—G. Gilchrist, state hy. engr., Austin, 3 rein.-con. bridges, Tarrant Co., to Jagoe Constr. Co., Lewisville, $73,355 est. $63,000—rein.-con. bridges, Van Zandt Co., to J. F. Buckner, 407 North Main St., Cleburne, $29,590 est. $28,800—rein.-con. bridges, Runnells and Coleman Counties, to Austin Bridge Co., Box 1094, Dallas, $41,671 est. $45,000—Jack Co., to G. F. Davis, Springtown, $34,709 est. $41,400—Gillespie Co., to E. W. Hable, Corsicana, $44,453 est. $37,800. Grand total $223,778. Noted Nov. 27.

Texas—G. Gilchrist, state hy. engr., Austin, rein.-con. bridges on Hy. 73, Harris Co., to J. F. Buckner, 407 North Main St., Cleburne, $28,597 est. $30,600—on Hy. 7, McLennan Co., to P. W. Bertram, Box 1030, Abilene, $34,913 est. $40,000—steel, concrete, timber pile trestle bridges, on Hy. 21, Brazos Co., to Russ Mitchell Inc., 710 Petroleum Bldg., Houston, $90,411 est. $50,400. Grand total $153,921.

Utah — State Rd. Comn., Salt Lake City, grading, widening 30 concrete bridges on North and South State Hy. between Ogden and Provo, Salt Lake, Utah and Davis counties, to F. W. Whiting, Kaysville, $28,396. Est. $37,000. Noted Nov. 27.

Washington—S. J. Humes, dir. State Hys., Olympia, 442 ft. bridge over Snoqualmie River, King Co., to General Contg. Co., Colman Bldg., Seattle, $61,431; 155 ft. bridge over Little Klickitat River, Klickitat Co., to L. S. Duff, Seattle, $13,649. Noted Nov. 13, under "Streets and Roads."

STREETS AND ROADS

BIDS ASKED

Ala., Birmingham—Dec. 20, by City Comn., grading, concrete sidewalks, guttering, curbing, 2 in. asphalt on 6 in. concrete paving 9 blocks Green Spring Ave. and Goldwire St., 30 ft., $42,150. A. J. Hawkins, city engr.

California—Dec. 23, at office C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, clearing, grubbing right-of-way, drainage structures 7.4 mi. Washington Rd., Nevada Co. State furnishes corrugated metal pipe.

California—Dec. 24, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading 7.4 mi. Washington-Summit Rd., Nevada Co.; grading, oil treated crushed gravel or stone surfacing 29.2 mi. Essex-Klinefelter Rd., San Bernardino Co.

California—Dec. 30, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 7.99 mi. Sect. F, Route 23, Quincy-Beckwith Natl. Forest Hy., Plumas Co.

Calif., San Diego — Dec. 22, by Common Council, grading, curbing, guttering, sewers, water mains, 6 in. asphaltic concrete on prepared sub-grade paving 127,700 sq.ft. Madison Ave. and 40th St. H. W. Jorgensen, city engr.

Fla., St. Petersburg—Dec. 19, by Bd. Comrs. Pinellas Co., (Clearwater), furnishing, applying 39,291 gal. oil asphalt and 997 tons cover material of either slag or granite or both on Roads 3 and 4, Sect. 1, Road 4, part of Sect. 2 and 64th St. South Rd. C. E. Burleson, co. engr.

Idaho — Dec. 16, by J. D. Wood, comr. P. Wks., Boise, grading, surfacing 2.831 mi. North-South Hy. between Lewiston and Washington state line, Nez Perce. J. J. McCreedy, Lewiston, dist. engr.

Idaho — Dec. 16, by J. D. Wood, comr. P. Wks., Boise, grading, crushed rock surfacing 5.986 mi. Camas Prairie Hy. between Grangeville and Dewey Saddle, Idaho Co. J. J. McCreedy, Lewiston, dist. engr.

Ill., Chicago — Dec. 16, at office Bd. Local Impvts., City Hall, grading, curbing, guttering, sewers, 8 in. concrete paving West 56th, 96th, 97th, 98th, 99th and Wallace Sts., Baltimore, Chappel, North Meade, South Seeley, Emerald, South Union, Lowe, Parnell, South Hoyne, South Tripp, South Kildare, and South Kolin Aves.—grading, curbing, guttering, removing trees, sewers, asphalt on 8 in. concrete paving West 83rd and South Wood Sts.—grading, curbing, guttering, sewers, asphalt on 6 in. concrete paving West 128th and 129th Places, North Paulina, South Green and South Peoria Sts., North Merrimac, Rascher, Wellington, North Sacramento and Albion Aves. M. J. Faherty, pres.

Ind., Evansville—Dec. 18, by Bd. Comrs. Vanderburgh Co., concrete surfacing Golf Drive Rd. $37,901. S. B. Bell, Evansville, aud.

Ind., Jeffersonville—Dec. 20, by Bd. Comrs. Clark Co., concrete surfacing C. E. Willey Rd. $27,651. O. B. Fifer, Jeffersonville, aud.

Kansas — Dec. 17, by State Hy. Comn., Topeka, at Court House, Emporia, grading, bridges 12.5 mi. F.A.P. 331, Rice Co.—5.5 mi. F.A.P. 389 and 391, Beardsley Co. — 1 mi. Kansas Project 15, Cowley Co.—12 mi. F.A.P. 411, Comanche Co.—grading 7 mi. F.A.P. 240 and sanding 11 mi. same road, Butler Co. W. V. Buck, hy. engr.

Kansas — Dec. 19, by State Hy. Comn., at Court House, Ft. Scott, grading, culverts, concrete slab surfacing 5 mi. Kansas Project 7, 18 and 30 ft., Bourbon Co.; 8.27 mi. Kansas Project 6, Federal Aid Project 424-A, Allen Co. W. V. Buck, hy. engr.

Kansas — Dec. 23, by State Hy. Comn., Topeka, at Court House, Lawrence, grading, bridging 3.016 mi. F.A.P. 243, Wabaunsee Co.—7 mi. U. S. Rd. 50, Osage Co.—10 mi. F.A.P. 315, Douglas Co. W. V. Buck, Topeka, hy. engr.

Kentucky—Jan. 14, by State Hy. Dpt., Frankfort, **(F.A.P. means Federal Aid Project and S.A.P. State Aid Project)** grading, drainage structures, surfacing 4.1 mi. Tyrone Bridge Approaches, F.A.P. 208-A.G.S., Anderson and Woodford Counties—1.3 mi. Boonesboro Bridge Approaches, F.A.P. 167-A.G.S., Clark and Madison Counties — 0.8 mi. Burnside Bridge Approaches, S.A.P. 22-F.G.S., Pulaski Co.—grading, drainage structures, curbing, guttering 0.56 mi. S.A.P. 2½ D. G., Webster Co. B. Johnson, chn.

Kentucky—Feb. 18, by State Hy. Dpt., Frankfort **(F.A.P. means Federal Aid Project)** grading, drainage structures, surfacing 3.4 mi. Spottsville Bridge Approaches, F.A.P. 206-A.G.S. and 2.7 mi. approaches to Ohio River Bridge near Henderson, F.A.P. 209-A.G.S., Henderson Co.—1.8 mi. approaches to Smithland Bridge, near Smithland, F.A.P. 216-A.G.S., Livingston Co.—2.3 mi. approaches to Eggners Ferry Bridge near Cadiz, F.A.P. 218-A.G.S., Marshall and Trigg Counties—4.7 mi. approaches to Tennessee River Bridge, near Paducah, McCracken and Livingston Counties—2 mi. approaches to Canton Bridge, near Canton Ferry, F.A.P. 217-A.G.S., Trigg Co. B. Johnson, chn.

Louisiana — Jan. 6, by State Hy. Comn., Baton Rouge, gravel or shell surfacing 7.9 mi. Many-Texas Line Rd., Sabine Parish—grading, shell or gravel surfacing 3.9 mi. Bushes Store-Killants Rd., Franklin Parish—6 mi. Ft. Jackson-Venice Rd., Plaquemines Parish—concrete surfacing 7.3 mi. Villa Platte-Reddel Hy., Evangeline Parish—6.6 mi. Hodge-Quitman Hy., Jackson Parish—3.1 mi. Denham Springs-Amite River Bridge Rd., Livingston Parish—11.6 mi. Kaplin-Abbeville Rd., Vermillion Parish—grad-

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Streets and Roads (Continued)

ing, drainage structures 8 mi. Start-Columbia Hy., Richland Parish — 3.2 mi. Gibson-Lake Bridge Hy., Terrebone and Assumption Parishes. W. H. Norckauer, hy. engr.

Louisiana—Jan. 6, by State Hy. Comn., Baton Rouge, concrete surfacing 11.6 mi. Sicard-Sterlington Hy., Ouachita Parish — 14 mi. Oberlin-Oakdale Rd., Allen Parish — 8.7 mi. Pakenham-St. Bernard Hy., St. Bernard Parish —12.7 mi. Homer-Haynesville Hy., Claiborne Parish—10 mi. Clayton-Vidalia Hy., Concordia Parish — 8.1 mi. Thibodeaux - Raceland Hy., Lafourche Parish—11.1 mi. Trout-Tullos Hy., La Salle Parish—10.4 mi. Amite-Tangipahoa Hy., Tangipahoa Parish — 10.8 mi. Bastrop-Sterlington Hy., Morehouse and Ouachita Parishes — 20.3 mi. Livonia-Port Allen Hy., West Baton Rouge and Pointe Coupee Parishes. W. H. Norckauer, hy. engr.

Md., Baltimore—Dec. 17, by Bd. Awards, concrete paving 8,000 sq.yd. footways in Footway Repair Contr. 6. N. L. Smith, Municipal Bldg., hys. engr.

Mass., Haverhill—See "Contracts Awarded."

Missouri—Dec. 19, by State Hy. Dpt., Jefferson City, grading, concrete, chat and gravel surfacing roads in Audrain, Barton, Dade, Cedar, DeKalb, Franklin, Gasconade, Greene, Lawrence, McDonald, Mississippi, Monroe, Newton, Nodaway, Polk, Randolph, Ripley, Taney, Warren and Wright Counties. T. H. Cutler, ch. engr.

New Hampshire—Dec. 23, by State Hy. Dpt., 2½ in. broken stone on 5 in. broken stone surfacing 1.977 mi. hy., Coos and Pinkham Notch, 24 ft. $86,000.

N. J., Elizabeth—Dec. 15, by Bd. Freeholders Union Co., Court House, grading, 9 in. rein.-con. or 3 in. asphalt on 7 in. concrete paving South Ave. $25,000 or more. R. Collins, Court House, co. engr.

New Mexico—Dec. 19, at office W. C. Davidson, state hy. engr., Santa Fe, constructing overpass, approaches, F.A.P. 125-G, Valencia Co.—graveling 5.2 mi. F.A.P. 143-D and 45 Reo., Dona Ana and Luna Counties—6.3 mi. F.A.P. 175-A, Union Co. — constructing Los Lunas Bridge, S.P. 674, U. S. Rd. 66-85, Valencia Co.

New York and New Jersey—Jan. 5, at office General Manager Port of New York Authority, 80-90 8th Ave., New York, paving, miscellaneous construction New Jersey Approach to Hudson River Bridge between Fort Washington, N. Y. and Fort Lee, N. J.; adv. E. N..R. Dec. 11.

New York—Dec. 17, by A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, wood block paving main and side spans of vehicular roadway for westerly upper deck; granite block paving Brooklyn and Manhattan approaches for westerly upper deck of Manhattan Bridge.

N. Y., Buffalo—Dec. 18, by G. Fisk, comr. P. Wks., paving Cazenovia Creek Blvd., Hastings Ave. and Janet St., repaving Chalmers Ave., Greenfield and Longnecker Sts. W. Rathman, city engr.

N. Y., Long Island City—Dec. 15, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., grading, granite block on concrete paving Grand St.—grading, curbing, sidewalks, sheet asphalt on concrete paving 123rd, 90th, 45th Sts., 35th, 95th, and 41st Aves.—bituminous concrete on concrete paving 83rd St. — grading sidewalks space curbing, walks, 66th St., Sutphin Blvd., Jackson and Arch Aves.—grading, curbing, sidewalks, 24th, 22nd (Sunwick) Sts., 43rd Ave.—grading, curbing, sidewalks, ramps, etc., Woodhaven Blvd. and 108th Ave.—grading Northern Blvd.

N. Y., New York—Dec. 16, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks on Oakley St., Watt, Ampere, Research and Pearsall Aves.

N. Y., New York—Dec. 17, by J. Miller, pres. Manhattan Boro, Municipal Bldg., widening granite block on concrete repaving Mulberry and Lafayette Sts.—grading, sheet asphalt on concrete paving West 93rd St. — constructing structural steel, rein.-con. ramp and approach floor under viaduct in Riverside Dr. West immediately south of West 158th St.

N. Y., St. George—Dec. 17, by J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete repaving Sand Lane from McLean Ave. to Staten Island Rapid Transit R.R.

Ohio—Dec. 23, by R. N. Waid, dir. Hys., Columbus, concrete paving 0.407 mi. Sect. "Mayfield Village" Salon-Willoughby Rd., Cuyahoga Co., $70,601—3.0594 mi. Sect. "N" Cincinnati-Batavia Rd., $168,116—1.128 mi. Sect. "S" Cincinnati-Dayton Rd., $67,288, both Hamilton Co.—grading, drainage structures 2.718 mi. Sect. "N" Dayton-Chillicothe Rd., Greene Co., $18,507—stone or slag surfacing 0.589 mi. Sect. "Painesville Bridge" Wickliffe-Madison Rd., Lake Co., $48,310 — surface treated macadam paving 8.286 mi. Sect. "F" and others, Toledo-Napoleon Rd., Lucas Co., $296,391.

O., Chardon—Dec. 15, by Bd. Comrs. Geauga Co., waterbound macadam paving 3 mi. Leroy Rd. $26,457. F. A. Fiedler, Court House, engr.

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O., Cleveland—Dec. 13, by Bd. Comrs. Cuyahoga Co., grading 82,000 cu.yd. Chagrin Falls-Greenville Rd. $28,700. F. Williams, Court House, engr.

Oklahoma—Dec. 16, by State Hy. Dpt., Oklahoma City, grading, drainage structures 6.5 mi. State Hy. 42, 32 ft., and 5 mi. State Hy. 64, 36 ft. Woods Co. $25,000 each. A. R. Losh, hy. engr.

Tex., Sweetwater—Dec. 15, by L. S. Polk, city comptroller, grading, curbing, sidewalks, guttering, paving 40,600 sq.yd.

Tex., Waco—J. H. Strange, city engr., and City Comn., bids about Dec. 16, 2 in. hot mix asphalt on 5 in. concrete or 6 in. rein.-con. paving 20,700 sq.yd. Jefferson Ave. $55,000.

Utah—Dec. 15, by State Rd. Comn., Salt Lake City, grading, graveling, 3 bridges on Midland Trail from Cisco to Colorado state line, Grand Co. H. S. Kerr, Capitol Bldg., Salt Lake City, engr.

Washington—Dec. 30, by S. J. Humes, dir. Hys., Olympia, grading, crushed stone surfacing 2.5 mi. Bellingham to Austin Pass branch, State Rd. 1, Whatcom Co.—3.2 mi. State Rd. 3, Dennison to Deer Park, Spokane Co.—2.1 mi. Lake Samish Rd., Whatcom Co.—grading 11.7 mi. State Rd. 7, Vantage to Burke, F.A.P. 148-C, Grant Co.—concrete paving 7.1 mi. State Rd. 12, Meskill to Beam Rd., F.A.P. 131D, Lewis Co.—2 bridges on Bellingham-Austin Pass branch State Rd. 1, 2.5 mi. from Bellingham, Whatcom Co.

Wash., Everett—Comrs. Snohomish Co., bids about Feb. 1, constructing 6.84 mi. Marysville-Warm Beach Hy., R. D. Alverson, Everett, co. engr.

CONTRACTS AWARDED

Ala., Auburn—Grading, sidewalks on 1 mi. streets, to Sullivan, Long & Hagerty, Bessemer, $30,176.

Ala., Birmingham—City Comn., to Fromhold Constr. Co., 1808 Lee Ave., 2 in. asphalt on 5 in. concrete paving 2 blocks 12th Court N., 30 ft., $6,566; 6 in. concrete paving 600 lin.ft. 25th St., 40 ft., $5,860; 2 in. asphalt on 6 in. concrete paving 1 block 36th Ave. N., 30 ft., $4,160—to H. M. Bowdry, Martin Bldg., 2 in. asphalt on 6 in. concrete paving 500 lin.ft. Cleveland Ave. and 16th Pl. S. W., 30 ft., $4,902—to Herring & Bragan, 310 North 11th St. S. W., 6 in. concrete paving 150 ft. 15th Ave., S., 25 ft., $1,070; 5 in. concrete paving 2 blocks 10th Alley S., 15 ft. $1,580. Grand total $24,138.

Ala., Gadsden—City Comn., grading, 7 in. concrete paving 10 blocks Noccaula Rd., to Rast, Jones & Griffith, 3024 South 20th St., Birmingham, $38,150.

Arizona — State Hy. Comn., Phoenix, oiling 5.8 mi. Washington Blvd., A.F.E. 8011, to N. G. Hill & Co., 1344 East McKinley St., Phoenix, $31,133. Noted Nov. 20.

Arizona—C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Calif., grading, crushed stone paving 11.32 mi. Clifton-Springerville Rd., Apache Co., to O. F. Fisher, Phoenix, $24,780. Est. $28,968. Noted Nov. 13.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, widening, bituminous macadam paving 10.7 mi. roads in Santa Clara Co., to Contoulas Constr. Co., San Francisco, $212,285; grading, widening, asphaltic concrete paving 6 mi. Imperial Co., to V. R. Dennis Constr. Co., 3911 5th St., San Diego, $227,453. Noted Nov. 13.

California — State Hy. Comn., Sacramento, grading, concrete surfacing 0.3 mi. Nijoqui Creek Hy., Santa Barbara Co., to Macco Constr. Co., Clearwater, $22,518; grading, bituminous macadam surfacing 3 mi. Alto-Waldo Rd., Marin Co., to Granfield, Farrar & Carlin, 67 Hoff Ave., San Francisco, $189,633. Noted Nov. 6.

Calif., Los Angeles—Los Angeles Co., grading, curbing, 6 in. asphaltic concrete paving 130,000 sq.ft. King Ave. and G. Street Impvt. Dist., to Griffith Co., Railway Bldg., $27,318.

Calif., San Diego—Common Council, A. H. Wright, city clk., grading, curbing, guttering, sidewalks, retaining wall, ornamental lights, 6 in. concrete paving 1,985 sq.ft., 6 in. asphaltic concrete paving 27,917 sq.ft. 1st St., also rein.-con., steel bridge, to R. E. Hazard Contg. Co., 2548 Kettner Blvd., San Diego, $123,809.

Calif., San Diego—Common Council, grading, curbing, sidewalks, 6 in. concrete paving 21,182 sq.ft. Eads Ave., to Griffith Co., 2104 Main St., $42,439. Noted Nov. 6.

Ga., Blackshear—Concrete paving, to Rutherford Constr. Co., Macon Natl. Bank Bldg., Macon, $31,930.

Illinois — State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving roads in Randolph Co., to Southern Illinois Quarry & Constr. Co., Murphysboro, $6,764—graveling Cook Co., to A. B. Bohlken, Arlington Heights, $15,662—grading Williamson and Johnson Counties, to S. J. Groves & Sons Co., 306 Globe Bldg., Minneapolis, Minn., $89,463 — Bond Co., to W. J. Sheppard, 1225 North Wells St., Chicago, $30,698. Grand total $142,592. Noted Sept. 18.

Ill., Hazelcrest — Concrete paving 10,940 sq.yd. 170th St., to Airey Constr. Co., Oak Park, $47,966.

Louisiana — State Hy. Comn., Baton Rouge grading, gravel surfacing 15 mi. roads in Moorehouse and West Carroll Parishes and 5.113 mi. West Carroll Parish, to Alexandria Constr. Co., Alexandria, $278,157 and $30,353 respectively —3.8 mi. St. Martin Parish, to I. M. Goldberg, Abbeville, $23,522—concrete surfacing 3.572 mi. Natchitoches Parish, to T. J. James & Co., Ruston, $88,280—9.4 mi. Grant and Winn Parishes, to B. T. Flynn, Oklahoma City, Okla., $243,785—5.5 mi. Richland Parish, to J. B. McCrary Co., Citizens & Savings Bank Bldg., Atlanta, Ga., $104,842. Grand total $768,939. Grading, gravel surfacing 8.3 mi. Caldwell Parish, from M. Harvey, Oxford, Miss., $84,048. Noted Nov. 6.

Massachusetts — Dpt. P. Wks., State House, Boston, bituminous macadam paving 5,248 ft. hy., Wareham, to John Iafolla Constr. Co., 298 East St., Dedham, $63,741—rein.-con. paving 8,488 ft. and bitulithic concrete on concrete paving 9,600 ft. hy. Wilbraham, to Lane Constr. Corp., 134 State St., Meriden, Conn., $105,738—widening concrete, stone arch bridge, and rein.-con. widening 13,650 ft. hy., Monson and Palmer, to P. J. Holland, 24 Ames St., Lawrence, $102,170. Grand total $271,649. Noted Nov. 27.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Colberg Ave., West Roxbury, to C. Struzziery, 115 Kittredge St., Roxbury. Est. $25,000.

Mass., Haverhill—Bituminous macadam paving throughout city, separate contracts. $75,000 appropriated. L. C. Lawton, City Hall, engr.

Mich., Detroit—Dpt. P. Wks., stone curbing, 3½ in. sheet asphalt on 8 in. concrete paving 11,800 sq.yd. Puritan Ave. from Asbury Park to Southfield Rd., to Cleveland Trinidad Paving Co., 715 Hammond Bldg., $41,250.

N. J., Summit—Bd. Freeholders Union Co., Elizabeth, paving 2 mi. Broad St. and Park Ave., to L. DiFrencesco, Inc., Westfield, $207,372. Noted Nov. 28 Daily.

New York—A. W. Brandt, comr. Hys., Albany, concrete repaving 0.38 mi. Westchester Co., to Immick Co., Inc., State St., Meriden, Conn., $91,976 est. $133,374—1.06 mi. Rockland Co., to Waterbury Concrete Constr. Co., Tuxedo Park, $159,682 est. $228,845—2.93 mi. Ulster Co., to Troy Paving Co., Troy, $119,925 est. $166,699—grading 8.64 mi. Orange Co., to Riteway Constr. Co., 299 Bway., New York, $117,277 est. $181,733—bituminous macadam paving 7.77 mi. Tompkins Co., to Bolton, Suits, Bolton & Gibbs, Watkins Glen, $158,819 est. $216,084—fencing east approach Mid Hudson Bridge, Dutchess Co., to Anchor Post Fence Co., Albany, $1,903 est. $2,074. Grand total $649,582. Noted Nov. 6.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., asphalt paving West 63rd and West 141st Sts., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $11,048 and $16,042 respectively—West 190th St., to M. Del Balso, 2551 Cruger Ave., $12,334—granite block paving Cooper Sq. and 2nd Ave., to E. T. Barry, 126-06 139th Ave., $15,610 and $15,310 respectively. Grand total $70,344. Noted Nov. 20.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, cinders on Rockland Ave. to Vanbro Constr. Co., 24 Elizabeth St., West New Brighton, $13,505; curbing Davis Ave., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $2,210. Noted Dec. 4.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete repaving St. Pauls Ave., to Vanbro Constr. Co., 24 Elizabeth St., West New Brighton, $28,500. Noted Nov. 21 Daily.

O., Akron — Summit Co., grading, draining, traffic bound slag paving 3.4 mi. Center Rd., C.H. 220, Sect. A and B, 28 ft., to Troyer Contg. Co., Inc., Aurora, $25,547. Est. $30,000.

Okla., Boise City — For 2½ in. vitr. brick paving 25,000 sq.yd., to S. S. Strong, Beaver, $67,000.

Okla., Oklahoma City—City Council, widening 3 blocks 2nd St., 70 ft., and grading, paving 6 blocks Cross St., 36 ft., to Western Paving Co., Petroleum Bldg., $22,922 and $26,823 respectively, est. $25,000 and $28,000 respectively.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., A. Murdock, dir., City Hall Annex, asphalt paving (assessment work) Large St. from Benner to Devereaux Sts., to Montgomery Paving Co., Harrison Bldg., $6,500—Washington St. from Limekiln to Thouron Sts. and improving (grading and paving, assessment work), Olney Ave. from Broad to 20th Sts., to Union Paving Co., Broad and Stiles Sts., $8,000 and $61,500 respectively—improving (grading, paving and repaving, assessment work), Passyunk Ave. from Broad to Jackson Sts., to Municipal Concrete Co., Washington Square Bldg., $87,000. Grand total $163,000. Rejected bids asphalt paving (assessment work), Overbrook St. from 57th to 58th Sts., and furnishing, delivering lumber for bridge work. Noted Nov. 13.

Rhode Island — State Bd. P. Roads, Providence, bituminous macadam paving 0.5 mi. hy. South Kingstown, Contr. 3035, to Ricci & Ricci Excavating Co., 189 Pocasset Ave., $14,761—1.7 mi. hy., Johnston, Contr. 3036, and rein.-con. paving 1.2 mi. hy., Narragansett, Contr. 3037, to M. A. Gammino Constr. Co., 728 Valley St.,

Streets and Roads (Continued)

Providence, $40,680 and $39,807 respectively. Grand total $95,248. Noted Nov. 20.

Tennessee—State Dpt. Hys. & P. Wks., Nashville, grading, drainage structures 8.399 mi. State Hy. 9, Jefferson Co., to N. L. Teer, Durham, N. C., $59,344—constructing 1.288 mi. approaches to bridge over Clinch River near Kingston, Roane Co., to Breland Lisle Constr. Co., Bluff City, $13,944—approaches to bridge over French Broad River near Dandridge, Jefferson Co., to Meriweather-Bayless Co., Nashville, $36,655. Grand total $109,943.

Tenn., Cookeville—City Clerk, grading, drainage structures, paving Broad and Cedar Sts., Paving Dists. 2 and 3, to T. C. Jones, Athens, $16,544.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, concrete paving 4.567 mi., Jefferson Co., to Broussard & Warfield Co., Beaumont, $103,128 est. $130,000—grading, drainage structures 21.904 mi., Atascosa Co., to F. P. McElwrath, Box 727, Corsicana, $80,603, est. $84,600—12.501 mi. Live Oak Co., to F. W. Heldenfels, Rockport, $69,436, est. $68,400—1.683 mi. Kaufman Co., to C. A. and J. W. Vilbig, Jr., 817 Bourbon St., Dallas, $25,248 est. $25,200—5.6 mi., Hall Co., to C. H. McClellan, 1402 Travis St., Wichita, $32,050 est. $40,000—8.052 mi., McLennan Co., to Hannah Constr. Co., and F. and D. Hall, Box 994, Waco, $42,257 est. $55,800—15.886 mi. Brazos Co., to J. S. Moore & Sons, Lufkin, $72,279 est. $66,400—7.682 mi., Harris Co., to C. K. Horton, Box 1394, Houston, $39,071 est. $50,400—14.881 mi., Wharton Co., to Brown & Root, 1904 Post-Dispatch Bldg., Houston, $70,521 est. $87,400—5.065 mi., Wise Co., to O. Speer, Alvord, $50,431 est. $54,000, all foregoing 26 ft. wide, 8.03 mi., McLennan Co., 26 ft., and triple asphalt on 8 in. compacted crushed gravel base course surfacing 12.265 mi. Throckmorton Co., to McClung Constr. Co., 1309 Fort Worth Natl. Bank Bldg., Fort Worth, $30,007 and $94,685 tively, all foregoing 18 ft. wide. Grand total $709,716.

Texas—State Hy. Dpt., G. Gilchrist, state hy. engr., Austin, grading, drainage structures 4.237 mi. Live Oak Co., to R. B. Holifield, 4847 Gurley St., Dallas, $63,184 est. $25,200—8.5 mi. Brazoria Co. and 10.32 mi. Morris and Bowie Counties, to Martin Bros., Goodhue Bldg., Beaumont, $66,024 and $83,709 respectively, est. $68,400 and $75,600 respectively—11.304 mi. Jack Co., to G. F. Davis, Springtown, $72,110 est. $90,000—12.855 mi. Gillespie Co., to E. G. Powell, Jacksonville, $43,863 est. $48,600—14.702 mi. Runnells and Coleman Counties, to White Bros., San Angelo, $41,134 est. $41,400—16.408 mi. Wheeler Co., to A. L. Cook, Ottawa, Kan., $54,046 est. $72,000—8.482 mi. Tarrant Co and 17.745 mi. Lubbock Co., to Womack, Henning & Rollins, Sherman, $57,616 and $38,048 respectively est. $54,000 and $46,800 respectively—7.348 mi. Van Zandt Co., and 7.963 ft. Henderson Co., to J. S. Moore & Son, Lufkin, $62,832 and $53,145 respectively est. $80,000 and $52,200 respectively — 9.418 mi. McLennan Co., to McClung Constr. Co., 1309 Fort Worth Natl. Bank Bldg., Fort Worth, $48,817 est. $54,000, all foregoing 26 ft. wide —gravel surfacing, cutting sub-grade and shaping shoulders, caliche and crushed stone base course surfacing 6.64 mi. De Witt Co., to Cocke & Braden, Marshall, $45,403 est. $63,000 (conditionally awarded)—gravel and limestone base course surfacing 9.757 mi. Fayette Co., to J. C. Kelly & Co., Inc., Trinity, $97,132 est. $90,000 — bituminous on crushed stone base course surfacing 9.77 mi. Tom Green Co., to J. E. Ward & Co., 716 Linz Bldg., Dallas, $95,342 est $95,000, all foregoing 18 ft. wide. Grand total $922,405. Noted Nov. 27.

Tex., Austin—Travis Co., gravel surfacing, cutting sub-grade and shaping shoulders 7.74 mi. Manor-Gregg Rd. and Wells Rd., 18 ft., to R. Canion, 1412 South 1st St., $34,365. Est. $35,000.

Tex., Dallas—Warrenite on 5 in. base paving Winnetka, Jefferson and Chester Sts., to Central Bitulithic Co., Praetorian Bldg., $33,680.

Washington—S. J. Humes, dir. Hys., Olympia, grading 0.7 mi. Ferry Co., to Lidral-Wiley, Inc., Seattle, $29,617 — 5.3 mi. Klickitat Co., to Graham Bros. & Medley, Chehalis, $66,800—0.5 mi. Mason Co., to Albertson & Cornel Bros., 1113½ A St., Tacoma, $12,942—9.3 mi. Clallam Co., to S. A. Moceri, Inc., Thompson Bldg., Seattle, $143,280. Grand total $252,729. Noted Nov. 13.

Wis., Milwaukee — Dpt. P. Wks., paving North 41st St., to J. C. Bluhm & Son, 1299 Achilles Ave., $18,082—West Roosevelt Dr., to Blech Constr. Co., 1537 Sherman Blvd., $41,258—East Kenwood Blvd., and West Vliet St., to Badger Constr. Co., 229 East Wisconsin Ave., $20,435 and $26,284 respectively. Grand total $106,059.

Wyoming—State Hy. Comn., Albany, gravel-ing 3.86 mi. Washakie Co. and 3.586 mi. Big Horn Co., to Taggart Constr. Co., Cody, $21,657 and $15,738 respectively—12.742 mi. Vinta and Sweetwater Counties, to Threet Bros., Lowell, $18,554—4.652 mi. Platte Co., to J. A. Elliot, Wheatland, $7,813—2.902 mi. Lincoln Co., to Robinson Constr. Co., Montpelier, Idaho, $9,375—gravel on shale base paving 10.588 mi. Crook Co., to Summit Constr. Co., Cheyenne, $36,048. Grand total $109,185. Noted Nov. 20.

Ont., Brampton—Peel Co., 5 ft. shoulders on each side, macadam paving 3¼ mi. Mississauga Rd., to T. Perluisi, Port Credit. Est. $25,000.

Ont., Bridgeburg — Town, concrete curbing, guttering, asphalt paving ½ mi., to Godson Contg. Co., 203 Richmond St. W., Toronto. Est. $25,000.

Ont., Riverside—Essex Co., concrete paving Lauzon Rd., 20 ft., to Cleary, Dean & Nicili, Highland Ave., Windsor, $32,000.

Ont., Toronto—City, brick block paving portion Dundurn Rd., to Grant Contg. Co. Ltd., 47 Wellington St. E., $1,655—asphalt paving Walnut and Elgin Aves., to McNamara Constr. Co., Ltd., 53 Yonge St., $4,604 and $7,522 respectively—bitulithic paving Preston Pl. and St. Clements Ave., to Asphaltic Concrete Co. Ltd., Sun Life Bldg., $5,177 and $14,199 respectively. Grand total $33,157.

Ont., Windsor—Essex Co. concrete paving 1 mi. Pipe Rd., Malden Twp., to Canada Paving & Supply Corp. Ltd., 30 Sandwich St. E., Windsor. Est. $25,000.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ill., East St. Louis—East Side Levee & Sanitary Dist., J. D. Johns, pres., 217 Metropolitan Bldg., diversion of Cahokia Creek through East St. Louis, incl. new outlet into Mississippi River. $1,900,000. E. F. Harper, c/o owner, engr.

N. J., Asbury Park—Deal and Asbury Park, dredging Deal Lake. $24,000.

Okla., Oklahoma City—Preliminary plans new drainage system in Wheeler Park, incl. 200,000 cu.yd. earth excav. $35,000. G. F. Brown, City Hall, engr.

Texas—Irrigation Dist., c/o J. Q. McAdams, et al., Robert Lee; surveys irrigation project on Colorado River, involving 150,000 acres, in vicinity Robert Lee, Bronte, Oak Creek and Winters. Municipal Eng. Co., Athletic Bldg., Dallas, and Ulen Co., Lebanon, Ind., engrs.

Ont., Sandwich — Twp. of Sandwich W., deepening, cleaning portion Grand Marais Drain, 5 mi. long, incl. constructing 5 concrete bridges, $90,000. J. C. Keith, Canada Bldg., Windsor, engr.

BIDS ASKED

Calif., Turlock — Dec. 29, by A. Sorensen, secy. Turlock Irrigation Dist. 648,540 sq.ft. 2 in. concrete canal lining, 452 cu.yd. concrete in canal structures, 8,330 lin.ft. 30 in. and 2,410 lin.ft. 36 in. concrete pipe.

La., New Orleans — Feb. 4, by Sewerage & Water Bd., at office A. G. Moffat, secy., 526 Carondolet St., materials for drainage stations, Contrs. 119-D, 208S, 209S and 210S-S; adv. E. N.-R. Dec. 11.

Mo., St. Louis—City, c/o Bd. P. Serv., City Hall, bids about Jan. 15, constructing Sect. J, River Des Peres Drainage Project between point 0.5 mi. north of Gravois and Frisco Ry., incl. open channel, 205 ft. wide at top and 125 ft. at bottom and average depth 20 ft. $1,000,000. W. W. Horner, city engr.

CONTRACTS AWARDED

La., Ponchatoula—Bd. Comrs. Gravity D.D. 2, c/o P. Drake pres., Tangiaphoa Parish, gravity drainage system, incl. earth excav. for drainage channels, clearing, cleaning natural stream channels, to Boone & Ester, Sellers, $120,265; rein.-con., timber bridges, to W. H. Groome & Son, Covington, $21,339. Noted Oct. 30.

Ont., Erieau—Harwich Twp., flood reclamation project, incl. earth dyking, wood and steel sheet piling, to Chambers, McQuigge & McCaffrey, 36 Toronto St., Toronto, $93,756. Est. $100,000. Noted Nov. 20.

Public Bond Elections

Coming Bond Elections

Water Distribution System, Tank, Pumps, etc.—Milbrae, Calif., $15,000.

Waterworks—Arlington, Kan., $32,000.

Waterworks—Jackson, La., Dec. 9, $20,000.

Waterworks Ext. — Checotah, Okla., Dec. 16, $30,000.

School — St. Louis Park, Minn., Dec. 16, $150,000.

Bonds Voted

Waterworks Impvts.—Wahpeton, N. D., $40,000.

Waterworks—Okarche, Okla., $50,000. Benham Engr. Co., Oklahoma City, Engrs.

Irrigation—Florence, Ariz., Randolph Irr. Dist., $624,000. Scott Engr. Co., Phoenix, Engr.

Court House—Goodland, Kan., $150,000.

School—Clayville, N. Y., $260,000.

Bonds Defeated

Waterworks—Perry, Okla., $249,000.

Sewerage System—Blanchard, Okla., $40,000.

Sewers—Sudan, Tex., $35,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Calif., Richmond—DREDGING—U. S. Eng., San Diego, dredging 524,400 cu.yd. material in Richmond Harbor.

Conn., Manchester — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Conn., Putnam—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Florida—TRAINING WALLS—U. S. Eng., Jacksonville, repairing 8 mi. training walls and revetments in St. John's River between entrance and Dames Point.

Fla., Jacksonville — POST OFFICE — Treas. Dpt. at office Sup. Archt., plans by H. J. Klutho, 2030 Main St., for U. S. Post Office and Court House, on Block 49 bounded by Julia, Duval, Pearl and Monroe Sts. Noted Dec. 4.

Illinois — DAM — U. S. Eng., Chicago, completing Brandon Rock Lock Dam, on Illinois Waterway.

Ind., South Bend—Treas. Dpt. at office Sup. Archt., U. S. Post Office, Jefferson and Main Sts. Noted Nov. 27.

La., Harvey — FOUNDATION, etc. — U. S. Eng., New Orleans, foundation, concrete work for new lock.

Me., Hallowell—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Mass., Provincetown—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office.

Mass., Taunton—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office addition, Cohannet St.

Minn., Minneapolis—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office, Marquette and 2nd Aves. S., 1st and 2nd Sts.

Missouri—CLUMP DIKES—U. S. Eng., Kansas City, 6,585 lin.ft. standard pile clump dikes in Missouri River at Chamois Bend, Mile 125.6, above the mouth.

New Jersey—DREDGING—U. S. Eng., 2nd Dist., New York, 56,729 cu.yd. material and 58,666 cu.yd. ledge rock in Passaic River.

N. Y., New York—DREDGING—U. S. Eng. 1st Dist., 16,745 cu.yd. rock and 7,225 cu.yd. material in Harlem River.

Utah, Salt Lake City—BARRACKS—Con. Q. M., additional barracks, at Fort Douglas.

BIDS ASKED

Ala., Mobile—DREDGING—Dec. 22, by U. S. Eng., 3,000,000 cu.yd. in section Mobile Channel; adv. E. N.-R. Dec. 11.

Ala., Fort McClellan—HOSPITAL—Jan. 5, by Con. Q. M., hospital.

Arizona—ROAD—Dec. 23, by C. H. Sweetser, dist. engr., Pub. Rds., 508 Ellis Bldg., Phoenix, grading 4.53 mi. Sect. 1, Route 19, Clifton-Springerville Natl. Forest Rd., Apache Co.

Calif., Oakland — DREDGING — Dec. 26, by U. S. Eng., San Francisco, 691,075 cu.yd. in Oakland Harbor. Noted Oct. 22.

Calif., San Diego—GYMNASIUM—Spec. 6275—Jan. 8, by Yards & Docks, Navy Dpt., welfare building, gymnasium. Noted Nov. 13.

Calif., Santa Ana—POST OFFICE—Jan. 12, by Treas. Dpt. at office Sup. Archt., constructing U. S. Post Office.

Conn., Milford—CLEARING SITE—Dec. 16, by Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office.

D. C., Wash.—BOILERS—Spec. 6318—Dec. 17, by Yards & Docks, Navy Dpt., furnishing, installing two 1,000 hp. boilers.

D. C., Wash. — CONCRETE DUCTS, etc. — Dec. 17, by Yards & Docks, Navy Dpt., concrete ducts, handholes, junction boxes, etc.

D. C., Wash.—TIMBERS—Dec. 23, by A. L. Flint, genl. purch. agt. Panama Canal, creosoted southern yellow pine or Douglas fir timbers, Schedule 2613.

Ill., Hines—INCINERATOR—Dec. 16, by Vet. Bu., Arlington Bldg., constructing complete garage and refuse incinerator at U. S. Veterans Hospital.

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Federal Government (Continued)

Ind., Fort Wayne—FEDERAL, etc.—Dec. 17, by Treas. Dpt. at office Sup. Archt., 3 story, basement, 150 x 180 ft. federal building and post office. B. Morris, 101 Park Ave., New York, consult. archt. Noted Sept. 25.

Ind., Indianapolis—HOSPITAL—Jan. 20, by Treas. Dpt., at office Sup. Archt., rein.-con., stone, West Riverside Dr. and 20th St.

Me., Brunswick—CLEARING SITE—Dec. 18, by Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office.

Mass., Boston—MACHINE TOOLS, etc.—Dec. 16, by Bureau Supplies & Accounts, Navy Dpt., machine tools, rivet, steel, sheet lead, aluminum alloy, ingot, for Boston Navy Yard.

Mass., Boston—MACHINE TOOLS, etc.—Dec. 19, by Bureau Supplies & Accounts, Navy Dpt., machine tools, pig iron.

Nev., Hawthorne — BUILDINGS, etc. — Dec. 26, by Yards & Docks, Navy Dpt., two 1 story, 23 x 41 ft. bulk TNT storage; two 2 story, 18 x 18 ft. box opening buildings; two 3 story mine filling houses; two 1 story, 79 x 99 ft. cooling and storage; 21 x 41 ft. crating and painting building; three small drilling buildings; 29 dugouts with barricades; emply mine storage building; conveyors, standard gage railroad, roads, walks, cable railway, mechanical distribution systems, cranes, hoists, trolley and chain belt conveyors, heating, boiler and mechanical equipment, plumbing, sewerage drainage, etc., at Naval Ammunition Depot. Noted Nov. 20.

Nevada — RAILROAD — Jan. 12, at office Bureau Reclamation, Las Vegas, 10.25 mi. railroad from Summit (near Boulder City townsite) to Hoover Dam, Boulder Canyon Project, Arizona-California-Nevada; adv. E. N.-R. Dec. 11. Noted Nov. 20.

N. H., Manchester—CLEARING SITE—Dec. 18, by Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office.

Tex., Randolph Field—CABLE—Dec. 15, by A. W. Parker, con. q. m., 250,000 ft. cable for underground electrical system. Noted Oct. 27.

Tex., Randolph Field — POWDER MAGAZINE, etc. — Jan. 5, by Con. Q. M., 1 black powder magazine and 1 combined timer and fuse magazine.

Va., Langley Field—SEAWALL, etc.—Jan. 2, at office Con. Q. M., seawall, embankment at Langley Field; adv. E. N.-R. Dec. 11.

Wis., Milwaukee—BREAKWATER—Jan. 7, by U. S. Eng., rebuilding 758 lin.ft. south breakwater; adv. E. N.-R. Dec. 11. Noted Nov. 27.

CONTRACTS AWARDED

Calif., Mare Island—STEEL—Yards & Docks, Navy Dpt., 5,694,000 lb. steel for Light Cruiser 38, to Worth Field Co., Claymont, Del., $104,033.

Calif., San Diego—WATER CONNECTION—Yards & Docks, Navy Dpt., water connection, at Naval Operating Base (Hospital), to F. A. Rhodes, San Diego, $3,285.

D. C., Wash.—OFFICE—D. Lynn, archt. of Capitol, 10 story, sub-basement, stone, for House of Representatives, to Consolidated Eng. Co., Inc., 20 East Franklin St., Baltimore, Md., $5,270,000. Noted Sept. 11.

Illinois—EARTHWORK—U. S. Eng., Custom House, St. Louis, Mo., 428,000 cu.yd. earthwork in Little Creek Drainage Dist. on Illinois River, Brown Co., to McWilliams Dredging Co., 75 East Wacker Dr., Chicago, at $0.1716. Noted Oct. 9.

Illinois — EARTHWORK — U. S. Eng., 428 Custom House, St. Louis, Mo., 1,800,000 cu.yd. earthwork in Eldred Drainage and Levee Dist., Greene Co., to C. R. Cummins, Inc., 1828 Union Trust Bldg., Cleveland, O., at $0.1248 per cu.yd. Noted Oct. 16.

Illinois — EARTHWORK — U. S. Eng., 428 Custom House, St. Louis, Mo., 1,800,000 cu.yd. levee work in Greene Co., to C. R. Cummins, Inc., 1828 Union Trust Bldg., Cleveland, O., $224,640. Noted Nov. 13.

Ind., Fort Benjamin Harrison—QUARTERS—Con. Q. M., 3 double sets non-commissioned officers' quarters, to J. A. Moraw, 144 West 47th St., Chicago, Ill. Noted Oct. 30.

Mo., Kansas City — EXCAVATING — U. S. Eng., excavating for U. S. Post Office, to G. H. Shartzer, North Irwin St., Dayton, O., $36,941.

Neb., Crete—POST OFFICE—Treas. Dpt. at office Sup. Archt., constructing U. S. Post Office, to E. Rokahr & Sons, Lincoln, 856 Steuart Bldg., Lincoln, $47,500. Noted Oct. 30.

N. Y., Mineola — HOSPITAL — Con. Q. M., Mitchel Field, post hospital, to Neinken-Mertz, Inc., 166 Montague St., Brooklyn, $125,97. Noted Oct. 23.

N. Y., New York—DREDGING—Spec. 6312—Yards & Docks, Navy Dpt., at U. S. Navy Yard, to Morris & Cummings Dredging Co., 44 Whitehall St., $100,000. Noted Nov. 6.

S. C., Parris Island—SWITCHBOARD—Yards & Docks, Navy Dpt., switchboard for central power plant at Marine Barracks, to Harrison Wright, 4 West 3rd St., Charlotte, N. C., $10,120.

S. C., Spartanburg—POST OFFICE—Treas. Dpt. at office Sup. Archt., general contract U. S. Post Office, to A. Blair, Montgomery, Ala., $227,497. Noted Nov. 6.

Wash., Fort Lewis—NURSES QUARTERS—Con. Q. M., nurses quarters, to W. T. Post, 4720 Pacific Ave., Tacoma, $30,210. Noted Oct. 30.

Wis., Marshfield — POST OFFCE — Treas. Dpt. at office Sup. Archt., U. S. Post Office, to McGough Bros., 244 Prior Ave., St. Paul, Minn., $74,450 Noted Nov. 6.

C. Z., Quarry Heights—QUARTERS—Dpt. Quartermaster, barracks at Albrook Field, to J. A. Jones Constr. Co., Commercial Bank Bldg., Charlotte, N. C. Est. $1,800,000. Noted Nov. 6.

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RAILWAYS

PROPOSED WORK

Texas — Panhandle & Santa Fe Ry., subsidiary Atchison, Topeka & Santa Fe Ry., W. W. Kelly, ch. engr. (western lines), Amarillo, 20 mi. standard gage line between Spearman and connection with Amarillo line. $300,000.

Ontario—Province of Ontario and Canadian Natl. Railways, T. T. Irving, ch. engr. (Central Region), New Union Sta., Toronto, subway in Oshawa (under construction) total cost $225,000, railway share $100,000; 2 subways on St. Clair Ave. W., Toronto, total cost $1,000,000, railway share $100,000; 5 mi. Brantford cut-off, railway share $1,350,000; subways and track elevation in London, total cost $1,207,010, railway share $503,505; railway trestle, Sudbury, railway share $179,589; freight shed, Fort William, railway share $132,000; diversion of line at Westport, railway share $550,000; relaying 160 mi. main line, railway share $1,103,054; 143 mi. branch lines, railway share $1,540,000.

BIDS ASKED

Ontario—See "Contracts Awarded."

CONTRACTS AWARDED

Ontario—Hydro-Electric Power Comn. of Ontario, F. A. Gaby, ch. engr., H. O. 190 University Ave., Toronto, double tracking Ottawa St. about ½ mi. electric street railway, in East Windsor, day labor. $30,000.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Sacramento—See "Grade Crossings."

Mo., Valley Park—Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., Missouri Pacific Bldg., St. Louis, rein.-con., steel subway to carry Big Bend Rd. under tracks 2 mi. east of here. $36,880.

BIDS ASKED

N. Y., Brooklyn—Dec. 16, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, constructing Sect. 9, Route 107, part Rapid Transit R.R. along and under Lafayette and Marcy Aves. and private property from Bedford Ave. to Middleton St.

N. Y., Long Island City—Dec. 23, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, constructing Route 108, Sects. 10 and 11, along and under Hillside Ave. from 137th to 178th Sts.

CONTRACTS AWARDED

New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, installing tracks and contact rail for part Rapid Transit R.R., Route 107, Sects. 11 and 12, part Sect. 13, Route 108, Sect. 1 and part Sect. 2, Manhattan, Brooklyn and Queens Boros, to McElroy & Kerwin, 370 Lexington Ave., New York, $348,882. Noted Nov. 13.

Pa., Phila.—Dpt. City Transit, C. E. Myers, dir., City Hall Annex, two-track subway in 8th St. from Ranstead to Locust Sts. and in Locust St. from 8th to 18th Sts., Contr. 303, to Golder Constr. Co., Ins. Co. North American Bldg., $4,431,847.

GRADE CROSSINGS

PROPOSED WORK

Calif., Sacramento—City and Southern Pacific R.R. Co., 65 Market St., San Francisco, H Street Subway. $95,000.

Mo., St. Louis—St. Louis & San Francisco Ry., F. G. Jonah, ch. engr., Frisco Bldg., and St. Louis Co. (Clayton, rein.-con. viaduct, approaches to carry Primary Relief Rd. 66 over railroad tracks. $66,065.

O., Niles—Bd. Comrs. Trumbull Co., Warren, rein.-con., structural steel grade crossing elimination over Pennsylvania R.R. tracks, $450,000. Wendell P. Brown, Finance Bldg., Cleveland, engr.

Tex., Bridgeport — Wise Co., c/o C. Faith, judge, Decatur, and Chicago, Rock Island & Pacific Ry., W. H. Peterson, ch. engr., Chicago, Ill., steel, rein.-con. overpass over railroad tracks, 1 mi. south of here. $35,000. O. W. Hunn, Decatur, engr.

Ontario—See "Railways."

CONTRACTS AWARDED

N. Y., Portageville—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., overhead bridge, approaches at Castile Rd., to Bates & Rogers, 75 West St., New York, $81,000.

DAMS

CONTRACTS AWARDED

Kan., Leavenworth—Forestry Fish & Game Comn., Topeka, at office of Governor, Topeka, dam 2½ mi. northwest of Tonganoxie, Sects. 1 and 2, Leavenworth Co., to H. C. Botsford, 650 West 69th St. Terrace, Kansas City, Mo., $103,216.

Mo., Bagnell—Union Electric Light & Power Co., 12th and Locust Sts., St. Louis, wire for Bagnell Dam, Osage River, to Indiana Steel Co. and J. A. Roeblings Sons & Co., Railway Exch. Bldg., St. Louis, est. $30,000; and 4,000 tons fabricated steel, to McClintic-Marshall Co., 1010 Pine St., St. Louis.

AIRPORTS

PROPOSED WORK

Conn., Hartford—City, Aviation Com., additional fireproof airplane hangar, C. Knox, Brainard Field, engr.

BIDS ASKED

Calif., San Francisco—See "Waterworks."

N. Y., Brooklyn—Dec. 17, by M. Cosgrove, comr. Docks, Pier "A," Battery Pl., New York, constructing, erecting administration building with appurtenances, at Municipal Airport (Floyd Bennett Field), Flatbush Ave.

Pa., Pittsburgh — Dec. 16, by Bd. Comrs. Allegheny Co., 519 Smithfield St., excavation and foundations for administration building, hangars, garage; also 1,850 cu.yd. 1:2:4 transit mixed concrete, 166,200 lb. ½ in. reinforcing bars, 2- to 6-ft. long, 50 lb. steel I-beams 6 in. x 12 ft. 5 in., 100,000 ft. or more f.b.m. fir or yellow pine lumber at Mifflin Junction $45,000. Noted Nov. 27.

CONTRACTS AWARDED

N. Y., Brooklyn—M. Cosgrove, comr. Docks, Pier "A" Battery Pl., New York, steel sheet pile bulkheads, widening pier approach and repairing existing approach removing and grading excess sand, creosoted timber ramp, constructing beach, at Municipal Airport (Floyd Bennett Field), Contr. 1999, to C. F. Vachris, 148 85th St., $148,164. Noted Nov. 20.

POWER AND LIGHTING

PROPOSED WORK

Ill., Evanston — City passed ordinance providing $1,438,000, ornamental street lighting system.

Ia., Davenport—See "Sports and Parks."

Texas—West Texas Utilities Co., Abilene, 25 mi. power or transmission lines incl. 3 mi. line in Wilbarger Co. oil field, single phase extension to Cosden Oil Co. and lines to serve Eastern Oil Co. and Empire Fuel Co. $75,000. Private plans.

Texas—West Texas Utilities Co., Abilene, new distribution systems in towns of Dalhart, Rowena, Hawley and Hamlin. Private plans.

Tex., Yoakum—See "Power Plants."

BIDS ASKED

Calif., Los Angeles—Dec. 16, by City Purchasing Agent, traffic signals for 23 street intersections.

Mo., Bagnell—Union Electric Light & Power Co., 12th and Locust Sts., St. Louis, taking bids transmission line insulators, etc., for Bagnell Dam, on Osage River. $300,000.

CONTRACTS AWARDED

New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, block signalling and interlocking equipment for portion Independent System of City-owned Rapid Transit R.R., Contr. S2, Manhattan and Queens Boros, to General Railway Signal Co., 230 Park Ave., New York, $2,178,000. Noted Oct. 23.

New York and New Jersey — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., multiple duct underground conduit system between Substation 4, Kearny Junction, N. J., and Sunnyside Yard, Woodside Ave., Long Island City, N. Y., to Gibbs & Hill, Inc., Pennsylvania Sta., New York, $96,000.

SPORTS AND PARKS

PROPOSED WORK

Calif., Brawley—See "Buildings—Unclassified."

Conn., Hartford—City, Park Dpt., swimming pool at Keney Park, $40,000; concrete swimming pool at Colt Park, $50,000. R. N. Clark, City Hall, engr.

Conn., Windsor — Loomis Institute, N. H. Batchelder, headmaster, sketches by R. H. Dana, 350 Madison Ave., New York, gymnasium and athletic field, campus. $175,000. **Maturity indefinite.**

Ill., Chicago—See "Schools."

Ia., Davenport — Levee Imprvt. Comn., W. Priester, secy., soon takes bids rein.-con., brick stadium, baseball grounds, football field, tennis courts, playgrounds and lighting system. $60,000. Clausen, Kruse & Klein, Kahl Bldg., archts.

Mass., Boston—City, Park Dpt., 33 Beacon St., enlarging Tennean Beach, Dorchester. $25,000. J. J. Murphy, 33 Beacon St., engr.

Mass., Boston—City, Park Dpt., 33 Beacon St., bleachers and playground improvements, Healy Playground, Dorchester. $75,000 appropriated.

Mass., Boston—City, Dpt. Parks, 33 Beacon St., locker building and bleachers, Adams St., Dorchester. $75,000. J. J. Murphy, Park Dpt., 33 Beacon St., engr.

Mass., Boston—City, Park Dpt., 33 Beacon St., playground, Parker Hill Sect., Roxbury. To exceed $25,000. J. J. Murphy, Park Dpt., 33 Beacon St., engr.

Mass., Boston—City, Park Dpt., 33 Beacon St., locker, Billings Field, West Roxbury. $25,000; locker at North End Park, Boston Proper, $125,000. Engineer not selected.

Mass., Hyde Park—City of Boston, Park Dpt., 33 Beacon St., Boston, receiving sketches municipal golf course, Grew Estate. $200,000.

Mass., Lowell—City, T. H. Braden, mayor, City Hall, stadium, at First St. Oval. $30,000. Engineer not selected.

Mass., Oak Bluffs—Town, A. F. Leonard, chn. com., receiving tentative sketches reconstructing church into gymnasium, auditorium, rear of Oak Bluffs School. $25,000-$30,000. Engineer not selected.

Mass., Salem—City, O. G. Pratt, supt. Park Comn., municipal golf course, Highland Park. $30,000. Engineer not selected.

Mass., Somerville (br. Boston)—City, Park Dpt., grandstand and field house at Glen St. Playground. To exceed $25,000. Engineer not selected.

Mo., St. Louis—City, c/o Bd. P. Serv., City Hall, preliminary plans 1 and 2 story, 82 x 116 ft., brick, concrete, stone bath house, incl. 35 x 75 ft. swimming pool. $100,000. L. R. Bowen, city engr. A. Osburg, city archt.

Mo. St. Louis—City, Bd. P. Serv., City Hall, preliminary plans developing Aloe Plaza between 18th and 20th Sts., from Market to Chestnut Sts., incl. walks, driveways, foundations, pool, etc. $200,000.

N. Y., Long Island City—Sunnyside Outdoor Recreation Center, 501 Madison Ave., New York, lockers, 51st St. and Roosevelt Ave. $40,000. W. Haugaard, 185 Madison Ave., New York, archt.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Central Park, rejected bids Nov. 25, repairing seawall at Battery Park. Noted Nov. 20.

N. Y., Piermont—Lucht & Anderson, archts., 432 Palisade Ave., Cliffside, soon let general contract 1 and 2 story bath houses, pavilion, 70 x 180 ft. swimming pool, for H. and H. Corp., c/o architect. Noted Nov. 27.

BIDS ASKED

Conn., New Haven—City, Park Dpt., City Hall, taking bids (1st unit) 1 story, 92 x 110 ft., brick, rein.-con. bathhouse at Lighthouse Point. $25,000 or more. R. W. Foote, 185 Church St., engr.

D. C., Wash.—Dec. 12, (extended date) by Dist. Commissioners, District Bldg., athletic field, Western High School; adv. E. N.-R. Dec. 11. Noted Nov. 20.

N. Y., Brooklyn—Dec. 16, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, repairing, constructing existing picket fence in a concrete coping along Prospect Park Southwest from 15th St. entrance to Park Circle; repaving Fort Hamilton Parkway from East 5th St. to 37th St.; constructing, completing garage addition used for storage purposes and paint shop, Prospect Park.

N. Y., New York—Dec. 16, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, sheet asphalt and concrete repairing parkway and park roads, Bronx Boro; grading with earth or cinder fill Rice Memorial Playfield, Pelham Bay Park, Bronx Boro; additional sewer system in Manhattan Sq., Manhattan Boro.

N. Y., New York—Dec. 18, by W. C. Martin, supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, grading, retaining walls, paving, fencing, handball courts, for playgrounds P. S. 21, 225th and 226th Sts. near White Plains Ave.; P. S. 26, Andrews and Burnside Aves.; P. S. 37, 145th and 146th Sts., east of Willis Ave.; P. S. 65, 141st St. between Cypress and Powers Aves.; P. S. 68, Strang and Monticello Aves., Bronx Boro, for Bd. Educ., 500 Park Ave.

CONTRACTS AWARDED

N. J., Newark—Bd. Educ., Bd. Educ. Bldg., grading, playground West Side School, to Benigs & Delapela, 250 Springfield Ave., $38,599. Est. $55,000. Noted Nov. 28 Daily.

N. Y., Babylon — Long Island State Park Comn., Administration Headquarters, Belmont Lake State Park, general contract 1 story bath house, to Henderson & Thompson, 1 West 1st St., Fulton, $19,284; sanitary work, to Barehan & McFarland, 366 Main St. E., Rochester, $4,129.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, filling portion Marine Park, to Atlantic, Gulf & Pacific Co., 13 Park Row, New York, $163,350; constructing playground, to Heaphy Constr. Co., $24,079; improving Ocean Parkway, to B. Turecamo, New Cropsey Lane, $55,509; Grand Army Plaza, to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., $23,382; improving Canarsie Park, to McDermott & Hanson, $17,019; resurfacing cinders east traffic road, to T. Connor Contg. Co., $5,895; repairing sheet asphalt on Bay Parkway, to M. J. O'Hara, Neptune Ave. and West 19th St., $7,215. Grand total $296,440. Noted Dec. 4.

HEATING AND VENTILATING

BIDS ASKED

Calif., San Francisco—Bakewell, Brown & Bauer, archts., 251 Kearny St., taking bids mechanical work and plumbing 26 story, rein.-con., steel club annex, Post St. near Powell St., for Olympic Club, Post and Mason Sts. Total est. $2,000,000. Noted Dec. 4 under "Clubs."

O., Cincinnati—Dec. 16, by Graham, Anderson, Probst & White, archts., 1417 Railway Exch., Chicago, Ill., heating, plumbing, gas fitting, ventilating, drinking water cooling system and electrical branches in 17 story, basement bank, office addition (now under construction), together with all like work in connection with alterations to present building, 4th and Walnut Sts., for Fifth-Third Union Trust Co., Walnut St. Noted Aug. 21 under "Banks."

UNCLASSIFIED

PROPOSED WORK

Illinois—TELEPHONE IMPROVEMENTS—See "Contracts Awarded."

Mich., Detroit—UNLOADING ROCK—Detroit Edison Co., 2000 2nd Blvd., rein.-con. coal unloading dock, at Connors Creek power station on Detroit River, incl. coal handling and unloading equipment. Private plans.

Mo., Kansas City—PIPE LINE, etc.—Phillips Petroleum Co., Bartlesville, Okla., 120 acres gasoline pipe line terminal station, incl. tanks, pumps, stations, near here. $400,000. A. H. Riney, Bartlesville, Okla., engr.

N. J., South Amboy — DOCKS and TERMINAL—Sun Oil Co., M. Courtney in charge, 420 Lexington Ave., New York, and 1608 Walnut St., Phila. Pa., preliminary plans docks, terminal, David and Augusta Sts. $250,000. Private plans. Noted Sept. 18.

Oklahoma—OIL PIPE LINE—Empire Pipe Line Co., Bartlesville, 110 mi. 8 in. pipe line from oil fields in Oklahoma City to Healdton. $200,000. Private plans.

Okla., Binger—NATURAL GAS SYSTEM—Franchise election Dec. 9, natural gas system to State Fuel Supply Co., Anadarko. $30,000. Private plans. J. F. Klingman, mayor.

Okla., Geary — GAS DISTRIBUTION SYSTEM—State Fuel Co. of Anadarko, preliminary plans natural gas distribution system. $35,000. W. J. Halleman, secy.

Okla., Hinton — GAS DISTRIBUTION SYSTEM—State Fuel Supply Co. of Anadarko, preliminary plans gas distribution system. $30,000. J. Holleman, secy.

Okla., Laverne — GAS DISTRIBUTION SYSTEM — Franchise election Dec. 23, gas distribution system to State Fuel Supply Co. of Anadarko. $35,000. Private plans.

Pa., Morrisville—SAND and GRAVEL HANDLING PLANT—Warner Co., 1616 Walnut St., Phila., I. Warner, in charge, sand and gravel handling plant. Part of $900,000 expansion program.

Tex., Galveston—FISHING PIER, etc.—J. G. Nelson, 4439 Rawlings St., Dallas, fishing pier and 1,000 seating capacity auditorium. $500,000.

Tex., Pampa — CASINGHEAD GASOLINE PLANT—Empire Companies, Inc., Bartlesville, Okla., 6 unit casinghead gasoline plant, near here. $50,000. Private plans.

Canada — GAS PIPE LINE — Tri-Cities Utilities Ltd., c/o G. L. Ohrstrom, 40 Wall St., New York, preliminary plans natural gas pipe line from Kinsella, Alta. to Regina, Sask. $20,000,000. Ford, Bacon & Davis, 39 Bway., New York, engrs.

Ont., Copper Cliff—ROCK CRUSHING PLANT—Dpt. Northern Development, Parliament Bldgs., Toronto, rock crushing plant, equipment at old Evan's mine. $25,000. J. Sinton, Parliament Bldgs., Toronto, ch. engr.

Ont., Midland—STONE QUARRY PLANT, etc.—S. P. West Constr. Co., Ltd., Detroit St., Sandwich, stone quarrying and rock crushing plant on Giants Tomb Island with shipping docks. $50,000. Private plans.

Ont., Ottawa — ASPHALT PLANT — City municipal asphalt plant in connection with centralization stables, workshops, $25,000. A. F. Macallum, city engr.

BIDS ASKED

Mass., Danvers—REFRIGERATION EQUIPMENT—Dec. 16, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, furnishing, installing refrigerating equipment, insulating rooms.

Mass., Westfield—SPRINKLER SYSTEMS—Dec. 23, by Dpt. P. Health, State House, Boston, sprinkler systems in various buildings, Westfield State Sanatorium. $25,000 or more.

N. Y., Amenia—LAUNDRY HOPPERS, etc.—Dec. 23, by Dpt. Mental Hygiene, State Office Bldg., Albany, laundry hoppers, chutes, at Laundry Building, Wassaic State School; adv. E. N.-R. Dec. 11.

N. Y., Syracuse—DOCK, etc.—See "Contracts Awarded."

Tex., Huntsville—FISH HATCHERY—Dec. 22, by State Game, Fish & Oyster Comn., c/o A. E. Wood, chn., Austin, fish hatchery, near here. Noted Nov. 13.

CONTRACTS AWARDED

Illinois—TELEPHONE IMPROVEMENTS—Amer. Telegraph & Telephone Co., 829 Telephone Bldg., St. Louis, Mo., 3 story, 60 x 90 ft., rein.-con., brick booster station, in Edwardsville, to Hellrung Constr. Co., Alton, est. $62,000; company will install equipment for same; plans similar stations at Jewett and Vandalia; 174 mi. telephone cable from St. Louis, Mo., to Terre Haute, Ind., and 30 mi. underground cable line, cables carrying 200 telephone circuits, day labor. Total est. $3,000,000.

Kan., Kansas City—ASH HANDLING EQUIPMENT—City, ash handling equipment, to Allen, Sherman, Hoff Co., Lewis Bldg., Phila., Pa., $42,315.

Kan., Kansas City — COAL CRUSHER and CONVEYOR—Bd. P. Utilities, C. A. Lowder, secy., coal handling equipment, incl. coal crusher, conveyor, tracks for switches, to Stearns Co., 1021 Euclid Ave., Cleveland, O., $48,668.

Kan., Kansas City — PUMP HOUSE, etc. — Great Lakes Pipe Line Co., Ponca City, Okla., 1 story, 50 x 74 ft. pump house, 24 x 50 ft. boiler house, rein.-con., brick, to D. C. Bass & Sons, Enid, Okla. Est. $60,000.

Mo., Bethany—PUMPING STATION, etc.—Great Lakes Pipe Line Co., Ponca City, Okla., 1 story, basement, 50 x 94 ft. pumping station, 1 story, basement, 24 x 50 ft. boiler house, to D. C. Bass & Sons, Enid, Okla. Est. $60,000.

Mo., Osborne—PUMPING STATION, etc.—Great Lakes Pipe Line Co., Ponca City, Okla., 1 story, basement, 50 x 74 ft. pumping station, and 1 story, 24 x 50 ft. boiler house, to D. C. Bass & Sons, Enid, Okla. Est. $60,000.

New Jersey—FENDERS—State Hy. Comn., Trenton, fenders in Hackensack and Passaic Rivers, Hudson and Essex Counties, to Simpson & Brown, 90 West St., New York, $62,268. Noted Dec. 4.

N. Y., New York—REMOVING ELEVATED COLUMNS—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, removing and relocating roadway columns at River Ave. and McClellan St., to Eastern Constr. Co., 110 West 40th St., $5,408. Noted Nov. 6.

N. Y., Syracuse—DOCK, etc.—Solway Process Co., Milton Ave., dock, on Lake Onondaga, hoisting and stevedoring equipment, plant and storage alterations, separate contracts and day labor. $200,000.

Tex., Denton—ICE MACHINERY—City, ice plant machinery, to York Ice Mchy. Co., York, Pa., $28,317. Noted Oct. 9.

MATERIALS

PROPOSED WORK

PIG LEAD — Oakland, Calif. — East Bay Municipal Dist., 16th St., purchasing 50 tons pig lead.

PIPE—Helper, Utah—City Council soon takes bids 16,000 ft. 8 in. c.i. and steel pipe. C. Nyman, Helper, engr.

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Materials (Continued)

STEEL, etc.—Petrole, Ont.—Superior Sugars Ltd., F. J. Potter, pres. and mgr., 4886 Maplewood Ave., Detroit, Mich., wants prices 4,000 tons building steel, 250,000 gal. water storage tank; crude oil burners; molasses storage tanks; machine and blacksmith shop equipment.

BIDS ASKED

CEMENT—**Florida**—Dec. 22, by State Road Dpt., Tallahassee, 935 bbl. Portland cement, 43,000 lb. ¾ in. square deformed reinforcing steel bent according to Standard plans for concrete box culverts, 250 tons sand and alternate bids on 300 cu.yd. crushed stone or washed gravel for aggregates, f.o.b. Lacoochee, for Project 875, Rd. 23, Hernando Co.; also 150 tons sand and alternate bids on 125 cu.yd. crushed stone or washed gravel for aggregates, f.o.b. Rerdell, B. M. Duncan, state hy. engr.

LUMBER, PILING, etc.—**Indianola, Ia.**—Dec. 17, at office Auditor Warren Co., 380,000 f.b.m. fir lumber, 12,500 lin.ft. treated piling, 2,500 Butt treated guard rail post. D. L. Thomas, co. engr.

LUMBER, PIPE, PILING—**Mt. Ayr, Ia.**—Dec. 18, at office Auditor Ringgold Co., treated and untreated lumber and piling, corrugated pipe, sand, gravel, cement, traffic treads, reinforcing bars and hardware.

CABLE—**Phila., Pa.**—Dec. 16, by Dpt. City Transit, 6,000 ft. 50 and 6,000 ft. 25 twisted pair, No. 14, A. W. G. conductor double wrap-dry-paper insulated lead covered cable for fire alarm and police system, Contr. 32.

STRUCTURAL STEEL—**Phila., Pa.**—Dec. 16, by C. E. Walsh, purch. agt. Pennsylvania R.R. Co., Broad St. Sta., T. J. Skillman, ch. engr., 15 South 32nd St., structural steel, Contr. 34-1930.

REINFORCING BARS, LUMBER, CONCRETE, etc.—**Pittsburgh, Pa.**—See "Airports."

CONTRACTS AWARDED

CAST IRON PIPE, etc.—**Salem, Mass.**—City, D. Hamilton, purch. agt., furnishing cast iron pipe, to Donaldson Iron Co., Emaus, Pa.; gate valves, to Chapman Valve Mfg. Co., 71 A St., South Boston; hydrants, to Darling Valve & Mfg. Co., Williamsport, Pa. Est. exceeds $5,000.

BITUMINOUS CONCRETE—**New Brunswick, N. J.**—Bd. Freeholders Middlesex Co., 6,600 tons Type A bituminous concrete, to Standard Bitulithic Co., 50 Church St., New York, $82,500.

ASPHALTIC CEMENT—**Brooklyn, N. Y.**—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 150,000 gal. asphalt cement, to Warner Quinlan Co., 2 Park Ave., $7,305; 3,000 cu.yd. asphalt sand, to M. F. Hickey Co., foot 6th St., $2,610; 1,000 tons limestone dust, to New York Trap Rock Corp., 250 Park Ave., New York, $6,250. Grand total $16,165. Noted Nov. 13.

COPPER WIRE — **Seattle, Wash.** — Bd. P. Wks., soft drawn solid copper wire for City Light Dpt., to General Electric Supply Corp., Coleman Bldg., $38,130.

PIPE—**Milwaukee, Wis.**—For 12.7 tons c.i. pipe and castings, to Gloymorgan Pipe & Fdry. Co., at $128.75 per ton; four 24 in. and three 6 in. gate valves, to Michigan Valve and Fdry. Co., 3631 Parkinson St., Detroit, Mich., at $304.54 and $19.80 respectively.

EQUIPMENT

PROPOSED WORK

TRACTOR—**La Mesa, Calif.**—City purchasing 15 hp. crawler type tractor with 8 ft. scraper blade and scarifier attachment.

BIDS ASKED

ROAD GRADERS—**Abilene, Tex.**—Dec. 19, by Taylor Co., c/o T. K. Elpen, furnishing 1 or more 12 ft. road graders. Noted Dec. 4.

ROAD GRADERS—**Abilene, Tex.**—Dec. 23, by Taylor Co., c/o T. K. Epslen, judge, 1 or more 12 ft. road graders.

Buildings

BUILDINGS—RESIDENTIAL

BIDS ASKED

Calif., Los Angeles—See "Contracts Awarded."

Mass., Haverhill—Haverhill Trust Co., c/o C. V. Badger, archt., 50 Merrimack St., revised plans and soon takes new bids 4 story, basement, brick, stone, plain found., 13-15 Summer St. $150,000. Former bids rejected. Noted Nov. 13.

N. M., Clovis—Southern Natl. Hotel Corp., c/o F. Canady, San Antonio, Tex., and Clovis, bids about Jan. 1 or 10, general contract 9 story, basement, 48 x 100 ft., brick, rein.-con. hotel, plain found. $600,000. A. Fraser, 624 Amer. Natl. Bldg., Galveston, Tex., archt. Noted Sept. 18.

N. Y., Hollis—See "Contracts Awarded."

N. Y., Long Island City — See "Contracts Awarded."

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N. Y., New York—See "Contracts Awarded."

N. Y., New York—Corporation, c/o B. Lord, 420 Lexington Ave., general contract hotel and apartment, 315 East 56th St. To exceed $500,000. Caughey & Evans, 29 West 34th St., archts. **Maturity in February.** Noted Sept. 25, under "D. Fuller, c/o archt."

Pa., Dormont—See "Contracts Awarded."

Pa., Phila.—Oak Lane Plaza Corp., c/o H. Pearl, 13th St. and 68th Ave., taking bids 7 story, basement, 169 x 211 ft., steel, rein.-con., brick, plain found., 12th St. and 69th Ave. $400,000. A. Mueller, 901 Walnut St., archt.

Wash., Seattle — **E. Morrison**, archt., Lloyd Bldg., bids about Jan. 1, general contract 3 story, basement, 60 x 120 ft., rein.-con., brick, 1312 Terry Ave., for A. D. Mesher, McDowall Bldg. $200,000.

Wis., Milwaukee—Dec. 16, by M. Tullgren & Sons Co., archts., 20 Prospect Ave., general contract 9 story, basement, 40 x 130 ft., brick, steel, Kane Pl., for Owner, c/o architects.

CONTRACTS AWARDED

Calif., Los Angeles—Schechter & Isenberg, 1107 North Evergreen Ave., 5 story, basement, 60 x 139 ft., rein.-con., plaster, art stone, brick, incl. garage Hobart Blvd. between 5th and 6th Sts., day labor and sub-contracts. $200,000. M. Maltzman, 704 Union Bank Bldg., archt.

N. Y., Hollis—Sunflush Realty Co., 160-16 Jamaica Ave., 6 story, 64 x 90 ft. apartments, 194th St. and Sanford Ave., separate contracts. $240,000. M. Klien, 65 Court St., Brooklyn, archt.

N. Y., Long Island City—Polk Arms, Inc., 1350 Bway., New York, 6 story, 100 x 126 ft., 72nd St. and 37th Ave., separate contracts. $250,000. D. Lang, 110 West 40th St., archt.

N. Y., Long Island City — Windsor Constr. Co., Northern Blvd. and 93rd St., 6 story, 85 x 160 ft., 81st St. and Roosevelt Ave., separate contracts. $300,000. W. Hohauser, c/o owner, archt.

N. Y., New York—Cobham Realty Corp., W. Guthman, pres., 119 West 40th St., 12 story, 78 x 112 ft., brick, steel apartment, store, East 28th St. near Lexington Ave., to Bing & Bing, 119 West 40th St. Est. $375,000.

N. Y., New York—Corporation, c/o S. Kleinroch, 1548 East 27th St., Brooklyn, 6 story, 84 x 137 ft., Stratford Ave. and 172nd St., separate contracts. $225,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., New York—Guide Realty Co., H. C. Hall, pres., 200 West 72nd St., 22 Riverside Dr., separate contracts. $200,000. Boak & Paris, 10 East 40th St., archts.

N. Y., New York—Jefferson Homes, Inc., C. S. Cooper, pres., 521 5th Ave., 6 story, 82 x 150 ft., Furman and Nereid Aves., separate contracts. $240,000. C. Schaefer, Jr., 332 East 149th St., archt.

N. Y., New York — Landis Constr. Co., S. Metsch, pres., 4756 3rd Ave., 6 story, Morris Ave. and 182nd St., separate contracts. $150,000. R. Gottlieb, 4756 3rd Ave., archt.

N. Y., New York—La Sala Holding Corp., 155 Mosholu Parkway, 6 story, 100 x 119 ft., brick, steel, 234th St. and Webster Ave., separate contracts. $200,000. L. Pisciotta, 1912 Arthur Ave., archt.

N. Y., New York—J. R. Silverman, 9 East 38th St., taking bids on separate contracts 11 story, 69 x 82 ft., 102 West 85th St., for Nemal Realty Co., H. I. McCarthy, pres., 115 Bway. $375,000. C. H. Lench, 110 West 34th St., archt. Noted Oct. 16.

N. Y., New York—Sharon Trading Corp., R. Beneson, pres., 295 Madison Ave., 6 story, 97 x 100 ft., 228th St. and Carpenter Ave., separate contracts. $175,000. Lilien & Lilien, 645 Tremont Ave., archts.

N. Y., New York—Wabasco Realty Co., S. Lobel, pres., 2 Lafayette St., 6 story, 98 x 100 ft., Ogden Ave. and 167th St., separate contracts. $180,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., New York—M. Weiss, 986 East 181st St., 6 story, 73 x 106 ft., 181st St. and Bryant Ave., separate contracts. $165,000. Lilien & Lilien, 645 Tremont Ave., archts.

N. Y., New York—Wolab Realty Corp., c/o Farrar & Watmaugh, archts., 10 East 40th St., 11 story, 65 x 187 ft., 333 West 56th St., to H. Mandel, 10 East 40th St. Est. $1,250,000.

N. Y., New York—Wolab Realty Corp., E. H. Paul, pres., 141 Bway., 18 story, 172 x 178 ft. apartments, 330 West 57th St., to H. Mandel Building Co., 10 East 40th St. Est. $1,750,000.

O., Cleveland — M. H. Leeb Co., 955 Union Trust Bldg., 3½ story, 100 x 120 ft., brick, steel, stucco, to A. W. Pahner Co., 1643 Lee Rd., Cleveland Heights. Est. $250,000. Noted Sept. 25.

Pa., Dormont—F. W. Becker (builder) 3223 West Liberty Ave., 6 story, basement, 160 x 160 ft., brick, hollow tile, steel, stone hotel apartment incl. garage in basement, restaurant or ball room, lobby, West Liberty Ave. near Potomac, separate contracts. $750,000. Private plans.

N. B., Yarmouth—Canadian Pacific R.R. Co., J. M. R. Fairbairn, ch. engr., Windsor St. Sta., Montreal, Que., hotel, 2 mi. from here, to Parsons Constr. Co., Moncton, N. B. Est. $500,000.

Ont., Toronto—Glengrove Properties Ltd., c/o Kaplan & Sprachman, archts., 305 Dundas St. E., general contract 6 story, basement, 92 x 136 ft., brick, stone, concrete, marble, Yonge St. and Glengrove Ave., to H. A. Wickett & Co. Ltd., 156 Front St. E.; excavation, to J. B. Johnstone, 96 Maplewood Ave. Est. $300,000.

CLUBS

PROPOSED WORK

Mass., Brockton — Club National Building Comn., E. Perrault, chn. constr., 7 Foss St., revised plans by C. T. Olson, 21 High St., 2½ story, basement, brick, stucco, plain found., Center and Hunt Sts. $150,000. Noted Nov. 13.

N. Y., New York—National Bureau Y. M. C. A., 347 Madison Ave., bids after Feb. 1, negro branch, 174-184 135th St. A. L. Mackenzie, 5 East 57th St., archt. Noted Sept. 25.

Que., Montreal—Montreal Branch, B. P. O. E., T. V. Bell, chn. com., new home. $200,000.

BIDS ASKED

Conn., Bridgeport—Algonquin Club, 211 State St., taking bids brick, steel club house, Harrison and Golden Hill Sts. $200,000. F. J. Dixon, 340 State St., archt. Fletcher, Thompson, Inc., 1336 Fairfield Ave., engrs. Noted Aug. 15.

Ill., Chicago — Dec. 16, by Michaelsen & Rognstad, 3256 Franklin Blvd., 10 story, 118 x 173 ft., with 19 story tower club and office building, Michigan Ave. and 24th St., for Motorists Assn. of Illinois, 3254 South Michigan Ave. $1,500,000. Noted Aug. 21.

N. J., Freehold—Knights of Columbus, bids about Jan. 15, general contract 2 story, basement, brick, steel, $150,000. E. H. Schmieder, 3rd Ave., Spring Lake, archt.

HOSPITALS

PROPOSED WORK

Mo., St. Louis—Jewish Hospital of St. Louis, 216 South Kingshighway Blvd., Waldheim Health Clinic, 8 story, 4958 Forest Blvd, Project postponed indefinitely. Noted June 19.

N. J., Shongun—Bd. Freeholders Morris Co., Court House, Morristown, 3 story, brick addition to Shongun Sanitarium. $150,000. Architect not selected.

N. Y., New York—Mount Sinai Hospital, 1 East 100th St., bids in January, altering nurses' training school, 100th St. and 5th Ave. $175,000. Gehron & Ross, 101 Park Ave., archts. Noted Nov. 20.

O., East Cleveland (br. Cleveland) — Huron Road Hospital, E. P. Disbro, 8811 Euclid Ave., Cleveland, plans by George S. Rider Co., engrs. and archts., Marshall Bldg., Cleveland, 6 story, basement, brick, steel, concrete, Belmore and Terrace Rds. $1,000,000.

BIDS ASKED

D. C., Wash. — Dec. 19, by District Comrs., District Bldg., nurses home at Gallinger Municipal Hospital.

Miss., Jackson—Jan. 2, by Bd. Comrs. State Insane Removal Comn., 12 new units, incl. 7 cottages, 2 patients' buildings, main dining room and kitchen, brick, fireproof, for State Hospital for Insane, Rankin Co., near here. $750,000. N. W. Overstreet, Jackson, archt.

N. Y., Jamaica—Dec. 12, by Dpt. Hospitals, J. G. W. Greef, comr. Municipal Bldg., New York, general contract Buildings A, B, C, E, F, G and H, and connecting tunnels of Queens General Hospital, 164th St. between Goethals Ave. and Grand Central Parkway. S. W. Jones & J. E. Kliest, 25 West 45th St., New York, archts. Noted May 29.

N. Y., New York—Bronx Maternity Hospital, 1072 Grand Concourse, bids about Dec. 29, general contract hospital, 1072 Grand Concourse, B. H. Whinston, 6 East 46th St., archt. Noted Sept. 25.

Pa., Pittsburgh—J. F. McWilliams, archt., 6200 Penn Ave., taking bids on revised plans 5 story, basement, sub-basement, 104 x 135 ft., brick, steel, Indiana limestone nurses' home, incl. laboratory rooms, auditorium, stage, shower rooms, Frankstown, Washington and Shetland Aves., for Pittsburgh Hospital, 5911 Center Ave. Noted Nov. 13.

CONTRACTS AWARDED

Ill., Chicago—Berlin & Swern, archts., 228 North La Salle St., general contract 5 story U shape rein.-con., brick, stone nurses home for Lutheran Deaconess Home and Hospital, 1138 North Leavitt St., to E. P. Stramberg, 232 East Erie St.; plumbing, to M. J. Corboy Co., 426 North Des Plaines St.; heating, to G. H. Kirk, 6711 Wentworth Ave.; electric wiring, to Chester Johnson Electric Co., 26 North Jefferson St.; ventilating, to B. & F. Heating & Ventilating Co., 228 North La Salle St.; plastering, to Burson Bros., 118 East 30th St.; painting, to J. H. Mosack & Co., 442 Oakland Blvd.; terrazzo, to Illinois Terrazzo & Tile Co., 1229 Belmont Ave.; soft flooring, to Thomas Moulding & Flooring Co., 228 North La Salle St.; hardware, to Mid-West Hardware Co., 228 North La Salle St. Est. $200,000. Noted Oct. 9.

CHURCHES

PROPOSED WORK

Conn., New Britain—Italian Roman Catholic Church, P. Denugze, chn. building com., 84 Spring St., church. $150,000 or more. Architect not selected.

Md., Chestertown—J. J. Raskob, 230 Park Ave., New York, church, rectory, vicinity Point Farms estate. $250,000. **Maturity in April.**

Mass., Pocasset—Corpus Christi Parish, G. C. Maxwell, pastor, sketches by Maginnis & Walsh, Statler Bldg., Boston, church. $150,000.

N. J., Newark—Second Presbyterian Church, L. H. Clee, pastor, 294 Prospect Ave., rebuilding 2 story, basement tower, brick, steel, James and Washington Sts. $250,000. Engineer and architect not selected.

N. J., Paterson — St. Paul's Church, D. S. Hamilton, pastor, 425 Van Houten St., 2 story, basement, brick parish house, Van Houten St. $150,000. **Maturity indefinite.** Architect not selected.

R. I., Providence — St. Elizabeth Episcopal Church, J. M. Hobbs, chaplain, sketches by Howe & Church, Turke Head Bldg., altering and constructing addition to home, Melrose St. and Atlantic Ave. $150,000.

Tex., Wichita Falls—First Methodist Church, c/o J. R. Ogle, secy. Building Com., plans by R. C. Arnold, c/o Staley Bldg., 2 to 3 story, brick, rein.-con. church, Sunday school, plain found., Travis and 11th Sts. $100,000-$150,000.

BIDS ASKED

N. J., Perth Amboy—St. Michaels Church, c/o G. W. Brooks, archt., 216 Smith St., bids about Jan. 15, 2 story, basement, brick, steel, Hull Ave. $150,000. Noted Nov. 20.

CONTRACTS AWARDED

Calif., Sacramento — Roman Catholic Archbishop, brick, concrete church, 39th and J Sts., to W. C. Keating, Forum Bldg., Sacramento, $150,000. Noted Apr. 3.

SCHOOLS

PROPOSED WORK

Calif., Long Beach—Long Beach City School Dist. sketches vocational school, Willow and Pine Sts. $150,000. Architect not selected.

Calif., Los Angeles—Los Angeles City School Dist. plans by Architectural Dept. Bd. Educ., 2 story, 98 x 190 ft., rein.-con., brick auditorium, 1340 Westgate Ave. $175,000.

Calif., Los Angeles—Bd. Educ., plans by A. S. Nibecker, Jr., c/o Architectural Div. of owner, 2 story, 98 x 190 ft., rein.-con., tile University High School site. $175,000. O. W. Ott, Washington Bldg., engr.

Calif., Los Angeles—University of California, 405 Hilgard Ave., Westwood, Los Angeles, plans by D. H. McLellan, Architects Bldg., 3 story, basement, 126 x 160 ft., rein.-con., Hilgard Ave. and Manning St. $300,000.

Calif., Oakland—Roman Catholic Archbishop of San Francisco, 1100 Franklin St., San Francisco, plans by H. A. Minton, 1 Powell St., San Francisco, part 2 and 3 story, rein.-con. school, convent. $250,000.

Calif., Oakland—Roman Catholic Archbishop, 1100 Franklin St., San Francisco, plans by H. A. Minton, Eddy and Powell Sts., San Francisco, (1st unit) group rein.-con. buildings, incl. academic, auditorium and gymnasium buildings, Piedmont Highlands. $300,000.

Calif., San Francisco—City and San Francisco Co. plans by G. A. Lansburgh, 140 Montgomery St., Junior High School, Class A rein.-con., Appleton St. $600,000.

Calif., San Francisco—City and San Francisco Co. sketches fireproof grammar school, Connecticut St. $200,000. Architect not selected.

Calif., Westwood — Marymount College of The West, c/o R. Montgomery, Chamber of Commerce Bldg., Los Angeles, 50 x 450 ft. brick college. To exceed $150,000.

Conn., Danbury—City, trade school. $150,000. Architect not selected.

Conn., New Haven—Yale University, T. W. Farnham, in charge, bids after Jan. 1, general contract Divinity School, Hillhouse Ave. and Sachem St., $2,500,000; and Forestry School addition, Prospect St., to exceed $150,000. Delano & Aldrich, 126 East 38th St., New York, archts. Noted July 10.

Del., Lincoln—Delaware School Foundation, A. J. Taylor, vice pres., Du Pont Bldg., Wilmington, plans by Guilbert & Betelle, 20 Branford Pl., Newark, N. J., 2 story, basement, brick, steel school, plain found. $150,000. **Maturity indefinite.**

Ill., Chicago—Bd. Educ. sketches by W. R. McCornack, 1006 Carnegie Ave., Cleveland, O., steel, concrete, brick high school, incl. 2 swimming pools, Skoki Dist. $1,500,000.

Ill., Springfield—Concordia College, Caroune and Moffat Sts., H. A. Klein, pres., sketches by Helme & Helme, 1st Natl. Bank Bldg., 3 story, school, Caroune St. $250,000. **Maturity next summer.**

Ind., Rockville—Bd. School Comrs. plans by H. L. Fillinger, Dana, brick, steel school. $150,000.

Ind., South Bend—University of Notre Dame plans by Graham Anderson, Probst & White, 80 East Jackson Blvd., Chicago, Ill., E. N. Hurley School of Commerce, rein.-con., brick, $200,000. Noted June 5.

Mass., Acushnet—Town, A. Gautreau, chn. School Comn., school, Parting Ways. $150,000. Architect not selected.

Mass., Fall River — Sacred Heart Roman Catholic Church, E. Carr, pastor, 163 Winter St., sketches by Maginnis & Walsh, Statler Bldg., Boston, 3 story, basement, brick school, rectory, plain founds., Linden St. $300,000.

Mass., Sheffield — Town, Superintendent Schools, new high school. $150,000 or more. Architect not selected.

Mass., Waltham — Sacred Heart Roman Catholic Church, W. L. Ludessi, 311 River St., raising $150,000 or more funds, parochial school, Grove St. Architect not selected.

Mich., Battle Creek — Bd. Educ., plans by Warren S. Holmes Co., Lansing, 2 story, basement, brick, steel, rein.-con., plain found., Lakeview Dist. $150,000.

Mich., Detroit — Bd. Educ., 1354 Broadway Ave., plans by F. Eurich, Jr., 415 Brainard St., 2 story, basement, brick, steel, rein.-con. additional unit to high school group, plain found., Redford Dist. $775,000.

Minn., Minneapolis—Bd. Educ., 305 City Hall, 2 or 3 story, rein.-con., brick, stone school, University Ave. N. E. and Bway. $400,000. Private plans.

Minn., St. Paul—Church of St. John, J. E. Doyle, pastor, 977 East 5th St., 2 story, basement, brick, rein.-con., 5th St. and Forest Ave. $150,000.

Minn., St. Paul—College of St. Catherine, c/o Sisters of St. Joseph, 1890 Randolph St., rein.-con., brick gymnasium, Randolph St. and Cleveland Ave. $150,000.

Mo., Columbia—L. Cowan, secy. Bd. Curators University of Missouri soon lets contract completing Home Economics Building, Jamieson & Spearl, Arcade Bldg., St. Louis, archts.

Mo., St. Louis—St. Louis University soon lets contract School of Commerce and Finance, 5 story, basement, 125 x 184 ft., rein.-con., brick, stone, Lindell and Grand Blvds. H. P. Hess, 1001 Ambassador Bldg., archt.

Neb., Lincoln—Bd. Educ., J. G. Ludlan, secy., Senior High School, brick, rein.-con., stone, Adams and Baldwin Sts. between 61st and 63rd Sts. **Maturity indefinite.**

N. H., Manchester—City, M. Louis, mayor, City Hall, 2 story, basement, brick, stone school, Maple St. $150,000. Architect not selected.

N. J., Bordentown — Dpt. Institutions & Agencies, State House, Trenton, industrial school. $150,000 or more. Architect not selected. **Maturity indefinite.**

N. J., Bridgeville—Bd. Educ., White Twp., W. Lantz, clk., sketches by Jacobs & Everett, Commonwealth Bldg., Allentown, Pa., 1 story, basement, brick, steel.

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., revised sketches by V. H. Strombach, 1245 Springfield Ave., Junior High School, 3 story, basement, brick, steel, Myrtle Ave. and Delmar Pl. $400,000. Noted Nov. 21.

N. J., Newton—Bd. Educ., High School, revised plans by Hacker & Hacker, 201 Main St., Fort Lee, Junior High School, 2 story, basement, brick, steel, plain found. $150,000. Noted Nov. 27.

N. J., Paterson—State Bd. Educ., State House, Trenton State Normal School, 3 story, basement, brick, steel. $500,000. Architect not selected. Project in abeyance. Noted Nov. 13.

N. J., Teaneck—Bd. Educ., High School, 2 story, basement, brick, steel, rein.-con. high school addition. $650,000. **Maturity indefinite.** Architect not selected.

N. J., Westwood—Bd. Educ., High School, 2 story, basement, brick, steel, rein.-con. high school addition, plain found., 3rd Ave. $200,000. Architect not selected.

O., Oakwood—Bd. Educ., A. E. Clagett, supt. schools, plans by Schenck & Williams, 3rd Natl. Bank Bldg., Dayton, Junior High School, 3 story, basement, brick, steel, concrete, $350,000.

Okla., Claremore—State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches by Layton, Hicks & Forsythe, Braniff Bldg., Oklahoma City, dormitory for Oklahoma Military Academy. $150,000.

Okla., Duncan—Bd. Educ., C. P. Davis, pres., sketches brick high school, plain found., Spruce St. Election soon $180,000 for same.

Okla., Goodwell—State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches science building for Panhandle A. & M. School. $150,000.

Okla., Guthrie — Bd. Educ. sketches brick high school, plain found. $175,000. Architect not selected. W. R. Welch, mayor.

Okla., Lawton—State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches science building for Connor School of Agriculture. $150,000.

Okla., Tishomingo — State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches dormitory for Murray School of Agriculture. $175,000.

Okla., Warner — State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches new science building for Cameron School of Agriculture. $150,000.

Okla., Wilburton — State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches new dormitory for Oklahoma School of Mines. $150,000. Architect not selected.

Pa., Pittsburgh—St. Basils Roman Catholic Congregation, L. Stenger, pastor, 1735 Brownsville Rd., brick, steel school, Concordia Ave. $150,000. **Maturity in spring.**

R. I., New Shoreham—Town, A. S. Wing, supt., combined grade school. $150,000. Architect not selected.

R. I., Providence—City, Bd. Contr. & Supply, plans by T. J. H. Pierce, City Hall, school, probably brick, stone, Paul and Windmill Sts. $150,000 or more.

R. I., Providence—Brown University, C. A. Barbour, pres., soon lets contract 3 story, brick, steel addition to Faunce Hall. $150,000. Howe & Church, 1014 Turks Head Bldg., archts. Noted Nov. 20.

Wis., Milwaukee—Bd. School Directors plans by G. E. Wiley, c/o School Bd., Morgandale Elementary School. $300,000.

Que., Montreal — Roman Catholic School Comn., 117 Ste. Catherine St. W., plans by J. Sawyer, 1207 Guy St., St. Louis de Gonzague School. $350,000.

Que., Montreal — Roman Catholic School Comn., 117 Ste. Catherine St. W., plans by E. Latourelle, 6035 Christ Col., Ste. Claire School. $300,000.

BIDS ASKED

Calif., Oakland—Dec. 30, by Bd. Educ., City School Dist., Freemont High School, 3 story, basement, steel, concrete, Foothill Blvd. $400,000. Noted May 29.

Ind., Eminence — Dec. 29, by Bd. Comrs. Morgan Co., brick, steel school. $150,000. Henkel & Hanson, Connersville, archts.

Md., Baltimore — Dec. 24, by Bd. Awards, North-East Junior High School, 3 story, basement, 167 x 246 ft., brick, hollow tile, concrete, steel, Sefton, Bayonne and Carter Aves. $475,000. W. W. Emmart, Union Trust Bldg., archt. H. Massart, 328, North Charles St., engr.

Mass., Cambridge—Massachusetts Institute of Technology, K. T. Compton, pres., Charles River Rd., bids about Jan. 1, 5 story, basement, 50 x 300 ft., brick, limestone, steel, laboratory, physics and chemistry building, plain found., Charles River Rd. $800,000. Coolidge & Carlson, 89 State St., Boston, archts. C. T. Main, Inc., 201 Devonshire St., Boston, engrs. Noted Oct. 23.

Mass., East Boston (sta. Boston)—Dec. 31, by Dpt. School Buildings, Boston, 2 story, basement, brick, limestone, granite, plain found., Paris St., Ulysses S. Grant Dist. $150,000 or more. L. J. St. Amand, 101 Tremont St., Boston, archt. Noted Oct. 23.

Mass., West Roxbury (sta. Boston)—Dec. 24, by Dpt. School Buildings, Boston, altering and constructing 2 story, basement, brick, limestone addition, plain found., Washington St. $150,000.

N. J., Trenton—State Bd. Educ., bids about Jan. 7, auditorium and class room building at Teachers State College, Hillwood Lakes, $375,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted Dec. 4.

O., Toledo—Dec. 30, at office Clerk Bd. Educ., Feilbach School, Stanley Court and Wilson Pl. Dpt., Architecture of Bd. Educ., E. M. Gee, archt.

Wis., Milwaukee—Bd. School Directors, bids about Dec. 18, general contract Girls Trade School, 4 story, 160 x 195 ft., brick, steel, 19th St. G. E. Wiley, c/o School Bd., archt. Excavation, concrete foundation, awarded to Kroening Constr. Co., 39th and Mitchell Sts., $14,818. Noted July 10.

CONTRACTS AWARDED

Ariz., Lowell—Bisbee School Dist. 2, c/o C. W. Wittig, clk., general contract school, to R. E. McKee, 1918 Texas St., El Paso, Tex., $138,390; plumbing and heating, to J. Knox Corbell, Tucson, $29,600. Noted June 19. Electrical work, to New State Electric Co., Phoenix, $8,355.

Calif., Pasadena — Bd. Educ., general contract 1 story, basement, 120 x 180 ft., rein.-con. high school, to Metzger & Son, 332 West Jefferson St., Los Angeles, $128,800. Noted Oct. 30. Plumbing, to T. Haverty Co., 316 East 8th St., Los Angeles, $5,212; heating, to Jones Heating Co., 28 East Union St., $16,396; electrical work, to R. R. Jones Co., 1124 Fair Oaks St., $12,349.

Md., Baltimore—Bd. Awards, furnishing, delivering vitr. ring pipe to Bureau of Water Supply, to Baltimore Clay Products Co., 2113 West Lafayette Ave., $6,488.

Mass., Arlington—Town, Bd. Selectmen, 2 story, basement, brick, limestone high school addition, plain found., to Arlington Constr. Co., 691 Mass. Ave., Est. $275,000. Noted Nov. 13.

Mass., Cambridge — Radcliffe College, A. L. Comstock, pres., 10 Garden St., laboratory, chemistry and physics building, near college grounds, to Morton C. Tuttle Co., Park Sq. Bldg., Boston. $400,000-$500,000. Noted Oct. 30.

Mass., Fairhaven — Town, W. P. Gardiner, chn. building com., 2 story, basement, brick, steel school, auditorium, to O. & S. Lavigne, 10 Weybosset St., Providence, R. I., $133,788. Noted Nov. 13.

Mass., Hyde Park—City of Boston, Dpt. School Buildings, 2 story, basement, brick, stone school, plain found., Henry Drew Dist., to Hub Constr. Co., 27 School St., Boston. Est. $175,000. Noted Nov. 13.

Tex., Austin — University of Texas, Bd. Regents, c/o J. W. Calhoun, comptroller, 5 story, 54 x 200 ft., brick, stone, rein.-con. class room building, campus, to R. E. McKee, 1918 Texas St., El Paso, $279,000; heating, to Dixie Heating & Ventilating Co., 109-11 Fannin St., Houston, $28,435. Noted Nov. 13.

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Schools (Continued)

Tex., San Antonio—Society of Mary, c/o J. Waldron, 112 Pine St., or 3023 Cote Brilliante Ave., St. Louis, Mo., foundations for school, auditorium and gymnasium building, North St. Mary's St., to Walsh, Burney & Key, 928 North Flores St., $39,645. Noted Nov. 20.

Wis., Wauwatosa—W. T. Darling, secy. Bd. Educ., general contract 3 story, basement, 127 x 138 ft., brick, tile, terra cotta, to Pacholski & Doligalski, 634 West Mitchell St., Milwaukee, $173,632; heating, to Wenzel & Henoch Co., 498 27th St., Milwaukee, $38,375. Noted Nov. 13.

Que., Montreal — Roman Catholic School Comn., 117 Ste. Catherine St. W., general contract McGee College School, stone, to J. A. L. Leclair Dupuis Ltd., 620 Cathcart St., $348,000. Noted Nov. 27.

THEATRES

PROPOSED WORK

D. C., Wash.—Warner Bros. Theatres, 321 West 44th St., New York, plans by J. Eberson, 370 Lexington Ave., New York, theatre, $1,000,000.

O., Mansfield—Warner Bros. Theatres, Inc., 321 West 44th St., New York, plans by J. Eberson, 370 Lexington Ave., New York, theatre. Noted Oct. 9.

Pa., Wilkes-Barre — Warner Bros. Theatres, 321 West 44th St., New York, plans by J. Eberson, 370 Lexington Ave., New York, theatre. To exceed $150,000.

BIDS ASKED

O., Mansfield — Dec. 17, by Bd. Memorial Trustees, C. Willett, secy., King Bldg., 3 story, basement, brick, steel theatre. $400,000. J. Eberson, 370 Lexington Ave., New York, archt. Althouse & Jones, Farmers Bank Bldg., Mansfield, superv. archt. Paramount Publix Theatres, Paramount Bldg., New York, lessee.

CONTRACTS AWARDED

Calif., Oakland — Publix Theatres, Inc., Paramount Bldg., New York, Class A rein.-con., steel theatre, to G. Wagner, 181 South Park St., San Francisco, $1,000,000. Noted Dec. 4.

BANKS

PROPOSED WORK

Mich., Lansing—City Natl. Bank, plans by L. and K. Black, Capital Savings & Loan Bldg., 14 story, basement, 67 x 88 ft., brick, steel, concrete, stone bank, office, plain found., Washington and Michigan Aves. $600,000.

N. Y., New York—Chase National Bank, 18 Pine St., sketches by Graham, Anderson, Probst & White, 80 East Jackson Blvd., Chicago, Ill., 60 story, basement, bank, office. **Maturity in February.**

BIDS ASKED

Okla., Oklahoma City — Weary & Alford, archts., 1923 Calumet Ave., Chicago, Ill., bids about Dec. 16, superstructure and mechanical trades 32 story, 140 x 200 ft. bank and office, for First Natl. Bank & Trust Co., H. M. Johnson, pres. Total $3,000,000. Steel contract awarded to Capitol Steel & Iron Co., 1726 South Agnew St., $360,000. Noted Sept. 25.

CONTRACTS AWARDED

N. J., Montclair — Holmes & Von Schmid, archts., 42 Church St., general contract 1 story, basement, mezzanine bank, to Carlson Co., 89 Walnut St., Montclair, for Town Trust Co., 79 Walnut St. Est. $150,000. Noted Nov. 13.

Okla., Oklahoma City—See "Bids Asked."

OFFICES

PROPOSED WORK

Ont., Toronto—Four Hundred Fifty Bay St., Ltd., c/o Sparling, Martin & Forbes, archts., Trusts & Guarantee Bldg., 18 story, 51 x 164 ft., rein.-con., brick, stone, marble, Bay and Albert Sts. $800,000.

BIDS ASKED

N. J., Elizabeth—F. K. Sauer, 109 Broad St., taking bids general contract 2 story, basement office, stores, East Jersey City. $150,000. L. J. Keimig, 40 Princeton Rd., archt.

N. J., Jersey City—Spingarn Realty Co., J. Spingarn, pres., 590 Summit Ave., bids about Jan. 15, general contract 9 story, basement, 100 x 120 ft., brick, steel office, store, Newark and Oakland Aves. $750,000. W. Neumann, 26 Journal Sq., archt. and engr. Noted July 17 Daily.

CONTRACTS AWARDED

Calif., Los Angeles—State Mutual Building & Loan Assn., 722 South Spring St., 3 story, basement, 50 x 125 ft., Class A rein.-con. office, to Simpson Constr. Co., Architects Bldg., $200,000. Noted Nov. 6.

Mass., Boston—H. K. Ferguson, contractors, Park Sq. Bldg., foundation for Professional Arts Building, Trinity Pl., Dartmouth and Stuart Sts., to Scully Co., 238 Main St., Cambridge; caissons, to Gow Co., Park Sq. Bldg., for Professional Arts Building, Inc., 260 Tremont St. Est. exceeds $25,000. Noted Dec. 4.

Okla., Tulsa—Waite Phillips, Philtower Bldg., 4 story, 90 x 140 ft., rein.-con. addition, to W. R. Grimshaw Co., Kennedy Bldg., $380,000. Noted Dec. 4.

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STORES

PROPOSED WORK

Calif., Los Angeles—F. and W. Grand Co., 337 South Bway., soon takes bids 6 story, basement, 60 x 165 ft., steel, rein.-con., terra cotta, 541 South Bway. To exceed $150,000. Walker & Eisen, Western Pacific Bldg., archts. Noted July 31.

N. J., Palisades Park — Owner, c/o C. G. Mettberg, archt., 16 Depot Square Bldg., Englewood, sketches 2 story, basement, brick, steel store, office. $150,000.

Pa., Johnstown—Glosser Bros., Franklin and Locust Sts., sketches 7 story, brick, steel addition, basement and 1st 4 floors will connect with old building, Franklin and Locust Sts. $250,000. Architect not selected.

BIDS ASKED

Pa., Easton — Dec. 17, by Lovelace & Spillman, archts., 103 West Broad St., Bethlehem, 3 story, basement, 80 x 240 ft., brick, steel, plain found.

CONTRACTS AWARDED

N. J., Metuchen — P. G. Costa, c/o A. Merchant, archt., 1 Elm Row, New Brunswick, 2 story, basement, brick, steel store, apartment, to I. Cassera, 63 Hale St., New Brunswick. Est. $150,000. Noted Nov. 20.

Pa., Eldred—Bradford Electric Co., Electric Bldg., Buffalo, N. Y., general contract 2 story, brick, stone store, office and display rooms, to Simonsen & Lundgren, Bradford; plumbing and heating, to W. H. Simpson, 184 North Union St., Olean, N. Y.; electric wiring, to Cole Electric Co., Bradford.

LOFTS

PROPOSED WORK

Calif., Los Angeles—Owl Realty Co., Metropolitan Bldg., plans by E. Bergstrom, Citizens Natl. Bank Bldg., 5 story, basement, 50 x 155 ft., Class A rein.-con. loft, stores, 8th and Fowler Sts.

PUBLIC

PROPOSED WORK

Calif., San Bernardino—CITY HALL—Community Underwriters, Inc., Lane Mortgage Bldg., Los Angeles, sketches by J. M. Cooper Co., Rives-Strong Bldg., Los Angeles, rein.-con. $175,000 or more.

Conn., Washington — TOWN HALL — Bryan Memorial Trust, Town Hall, plans by C. Clark, 101 Park Ave., New York, brick, stone. $150,000.

Ill., Springfield—WOMENS—State of Illinois, C. Herrick Hammond, superv. archt., plans by State Division Architecture & Engineering, Capitol Bldg., 1 story, 206 x 255 ft., brick, stone, rein.-con., on Fair Grounds. $200,000.

Mo., Osage City—REFORMATORY—State, c/o F. B. Jones, dir. Penal Institutions, Jefferson City, sketches rein.-con., brick, stone administration building, 6 dormitories at Intermediate Reformatory. $600,000.

N. J., Asbury Park — BATH HOUSE and STORE—Bd. City Comrs., A. G. King, clk., City Hall, sketches by Warren & Wetmore, 16 East 47th St., New York, 2 story, basement, brick, steel, plain found., between 4th and 5th Aves. adjoining convention hall. $150,000. Noted Oct. 16.

N. J., Metuchen—HOME—Danish Brotherhood & Sisterhood of Eastern State, C. Borup, pres., 394 New Brunswick Ave., Perth Amboy, 2 story, basement, home for aged, brick, steel. $150,000. Architect not selected.

N. J., Morris Plains—ADMINISTRATION—Dpt. Institutions & Agencies, W. J. Ellis, comr., State Office Bldg. Annex, Trenton, plans by Dpt. Architecture & Constr., State Office Bldg., Trenton, rebuilding 3 story, basement, brick, steel, State Hospital Grounds. $300,000. **Maturity probably soon.**

N. J., Montclair — LIBRARY — Bd. City Trustees sketches by 2 story, basement, brick, steel, Church St. and Valley Rd. $150,000.

N. J., Weehawken — LIBRARY — Township Com., Municipal Bldg., brick, steel, Park and Hemphurst Sts. $150,000. Engineer and architect not selected.

O., Cleveland — UNDERGROUND PUBLIC HALL—City, D. E. Morgan, city mgr., estimates being prepared by H. Kregelius, city archt., City Hall, 1 story, brick, steel, concrete annex, Lakeside Ave. R. Hoffman, city engr.

Tex., Abilene—JAIL—Taylor Co., c/o T. K. Eplen, judge, plans by David S. Castle Co., 701 Alexander Bldg., and Nichol & Campbell, assoc. archts., Abilene, brick, steel, rein.-con., plain found. $100,000 or more. Noted Oct. 30.

BIDS ASKED

Mass., Worcester—MEMORIAL—City, bids about Mar. 1, general contract war memorial auditorium, Salisbury and Highland Sts. $2,000,000. F. C. Hirons, 40 East 49th St., New York, and L. W. Briggs & Co., Worcester, archts. **Maturity about Mar. 1.** Noted Dec. 4.

N. J., Bayonne — LIBRARY — Bd. Trustees Bayonne Free Pub. Library, Avenue C, bids about Jan. 15, 2 story, basement, 160 x 160 ft., brick, steel addition, Avenue C and 31st St. $150,000. C. Shilowitz, 26 Journal Sq., Jersey City, archt. Noted Sept. 8 Daily.

Ont., Toronto—PARLIAMENT—See "Contracts Awarded."

Que., Montreal—FIRE ALARM STATION—Dec. 19, by Chairman Executive Com., 108 x 146 ft. general fire alarm station, Fletcher's Field. $500,000.

CONTRACTS AWARDED

Mich., Kalamazoo—CITY HALL—City, general contract 3 story, basement, stone city hall, office building, Bronson Park, to O. F. Miller, Kalamazoo. Est. $500,000. Noted Nov. 13.

Ont., Toronto—PARLIAMENT—Province of Ontario, Dpt. P. Wks., Parliament Bldgs., 6 story, basement, concrete, stone addition to East Block-Parliament Buildings, day labor, under supervision of Jackson-Lewis Constr. Co., 95 King St. E. $1,000,000. Private plans.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Calif., Brawley—RECREATION—El Verde Recreation Center, c/o H. E. Werner, archt., 357½ North Beverly Dr., Beverly Hills, brick recreation buildings housing swimming pool, cafe, miniature golf course. $250,000.

Calif., Compton — MAUSOLEUM — Angelus Abbey Mausoleum Corp., c/o C. N. Aldrich, Pacific Southwest Bldg., Long Beach, rein.-con., marble, 4,000 crypts. $400,000. Noted Aug. 7.

Calif., San Francisco—COMMUNITY CENTER—Jewish Community Center, S. M. Ehrman, chn., 68 Post St., plans by Hyman & Appleton, 68 Post St., 2 story, basement, rein.-con., California St. $650,000.

Conn., Branford — MASONIC TEMPLE — Masonic Temple Assn., A. Bradley, Wilford Ave., masonic temple, Main St. $150,000. Architect not selected.

O., Cincinnati—STAGE TERMINAL, etc.—Colonial Stage Co., 708 Walnut St., plans by J. E. Branson, Union Trust Bldg., 2 story, basement, brick, rein.-con. stage terminal, garage, store, plain found., Sycamore St. $400,000.

Tex., Sherman — EXCHANGE — Northern Texas Telephone Co., Sherman, sketches 4 story, fireproof automatic telephone and office building. $350,000. Private plans.

Ont., Toronto—MERCANTILE—Robert Simpson Co. Ltd., 176 Yonge St., soon lets contract 6 story, basement, brick, stone, concrete addition, Mutual St. $250,000. Excavation awarded Dufferin Constr. Co., Fleet St. Private plans.

Ont., Petrolea — MAUSOLEUM — Canadian Mausoleum Co., C. R. Raynor, mgr., granite, Indiana limestone mausoleum at Hillsdale Cemetery. Private plans.

BIDS ASKED

Mass., South Boston (sta. Boston) — EXPOSITION—See "Contracts Awarded."

N. Y., New York—MARKET, etc.—P. Ohl, 258 Bway., taking bids on separate contracts 19 story, 75 x 94 ft. market, stores, apartment, 846 Amsterdam Ave. $300,000. N. Korn, 55 West 42nd St., archt. Excavation awarded to Marcus Contg. Co., 150 Nassau St.; steel and erection, to N. P. Winters Co., 15 East 40th St. Noted Nov. 20 under "Contracts Awarded."

CONTRACTS AWARDED

Calif., Los Angeles—MARKET—Gore Bros., c/o Balch & Stanberry, archts., Film Exch Bldg., part 1 and 2 story, basement, 125 x 176 ft., rein.-con., to Perkinson Co., 3977 South Vermont Ave., $150,000. Noted Oct. 23.

Mass., South Boston (sta. Boston) — EXPOSITION — New England States Century of Progress Exposition, J. J. Berger, mgr., Chamber of Commerce Bldg., Boston, thirteen 1 story, 100 x 700 ft. stucco, timber exposition buildings, incl. drives, walks, etc., Columbus Park, day labor. $2,000,000. J. N. Meserve, 260 Tremont St., Boston, archt. Noted Oct. 30.

N. Y., New York — MARKET — See "Bids Asked."

N. Y., New York—Findlay Holding Corp., L. Steinberg, pres., 1945 Loring Pl., 6 story, 66 x 96 ft., apartments, Davidson Ave. and Kingsbridge Rd., separate contracts. $150,000. N. Ratholz, 2419 Webster Ave., archt.

N. Y., New York — H. Building Co., P. Herschowsky, pres. 2484 Creston Ave., 6 story, 94 x 155 ft., Valentine Ave. and 201st St., separate contracts. $260,000. C. Kreymborg, 2534 Marion Ave., archt.

Ont., Toronto—MERCANTILE—See "Proposed Work."

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Ala., Mobile — PAPER MILL — Champion Coated Paper Co., North B St., Hamilton, O., L. Thompson, in charge, paper mill, near here. To exceed $1,000,000. **Maturity indefinite.**

Calif., Antelope—LIME PLANT and DRY ICE PLANT—California Lime & Products Co., R. L. Hollingsworth, genl. mgr., Lincoln, sketches 200 ton per day lime plant, liquid CO_2 plant, 50 ton dry ice per day. $500,000. Smith-Emery Co., 651 Howard St., San Francisco, engr.

Factories and Mills (Continued)

Fla., Miami—CANNING PLANT—Riverside Canning Co., W. C. Mudge, 68 West Flagler St., canning plant. $100,000.

Fla., Miami—MANUFACTURING, etc.—B. F. Goodrich Rubber Co., South Main St., Akron, O., manufacturing and distribution plant. To exceed $100,000. Private plans.

Mass., Martha's Vineyard—Cape and Vineyard Electric Co., Vineyard Haven, P. H. House, supt., power plant addition. $50,000. Private plans.

Mass., South Boston (sta. Boston)—FACTORY—Owner, c/o W. P. O'Brien, 209 Washington St., Boston, 2 story, brick, timber, 20,000 sq.ft. floor space, Dorchester Ave. $60,000. Architect not selected.

N. J., New Brunswick—YEAST FACTORY—Anheuser-Busch Inc., c/o A. A. Busch, pres., 721 Pestalozzi St., St. Louis, Mo., 7 or 8 story main building with additional supplementary structures, incl. garage, machine shop, power plant. $2,000,000. Noted Oct. 16.

N. J., Plainfield—DEXTRINE PLANT—National Adhesives Corp., A. Alexander, pres., 735 West Front St., 2 story, basement, brick addition, plain found., West St. $40,000.

N. Y., Albion—FACTORY—W. E. Mathews Cider & Vinegar Co., M. Buckley, factory. Architect selected.

N. Y., Jamaica—PUBLISHING—Long Island Daily Press Publishing Co., plans by F. Keeler, 203 West 13th St., New York, 3 story, 53 x 140 ft. publishing plant, 168th St. and Jamaica Ave. $75,000.

N. C., Canton—PAPER MANUFACTURING PLANT — Champion Fibre Co., Canton, c/o Champion Coated Paper Co., North B St., Hamilton, O., in charge, paper plant. To exceed $150,000. **Maturity in spring.**

N. D., Valley City — CREAMERY — North Amer. Creamery Co., Oakes, N. D., and Alexandria, Minn., plans by M. O. Buetow, 1380 Blair St., St. Paul, Minn., 2 story, basement, 65 x 140 ft., rein.-con., brick. $100,000.

O., Cleveland—PACKING PLANT—Cleveland Provision Co., H. A. Schanz, pres., 2527 Canal Rd., taking preliminary bids 2 story, basement, 125,000 sq.ft. floor space, brick, rein.-con., 3378 West 65th St. $250,000. P. Henschein, 59 East Van Buren St., Chicago, Ill., archt.

O., Cleveland—FACTORY—Yoder Co., C. M. Yoder, pres., 5500 Walworth Ave., soon lets contract 1 and 2 story, part basement, brick, steel, West 55th St. and Walworth Ave. $200,000. W. H. Hatch, 559 Hippodrome Bldg., archt.

O., Hamilton — PAPER MILL — Champion Coated Paper Co., North B St., L. Thompson, in charge, additions. To exceed $150,000. Part of proposed $1,000,000 expansion.

O., Lorain—FACTORY—National Stove Co., (subsidiary American Stove Co.), brick, steel factory unit to be used as enameling plant. $250,000. Private plans.

Okla., Chickasha — REFINERY — Chickasha Cotton Oil Co. plans by E. H. Eads & Co., Hall-Briscoe Bldg., 3 story, basement, 77 x 142 ft., rein.-con., brick. $50,000.

Okla., Seminole—GASOLINE PLANT—Empire Companies, Inc., Bartlesville, 6 unit casinghead gasoline plant between Seminole and Konawa. $50,000. Private plans.

Pa., Cedar Hollow — LIME MANUFACTURING PLANT, etc.—Warner Co., 1616 Walnut St., Phila., lime products manufacturing and distribution plant. To exceed $40,000. Part of $900,000 expansion program.

Va., Richmond — WOOD PRESERVING PLANT—Virginia Wood Preserving Corp., A. L. Clarke, pres., Wash., D. C., purchased 46 acre site and plans plant, near here. $300,000.

Tex., Brownsville — MANUFACTURING PLANT—V. Rivera & Sons, Monterrey, Mexico, tile manufacturing plant.

Tex., Houston — MANUFACTURING — Lone Star Cement Co., Post-Dispatch Bldg., and 342 Madison Ave., New York, cement manufacturing building extension and replacement equipment. $80,000. **Maturity about Jan. 1.**

Ont., London—FACTORY—Dennisteel Ltd., C. E. Jarmain, mgr., 22 Dundas St., 1 story, 100 x 100 ft., brick additioh. $50,000. **Maturity in spring.**

Ont., Port Colborne—CEMENT PLANT—Canada Cement Co. Ltd., HO.-Canada Cement Bldg., Montreal, Que., new cement plant, 500 ton daily capacity, wet process, cement making kilns, electric power, equipment, conveyors, storage bins in Humberstone Twp. $500,000. S. H. Barr, HO.-Canada Cement Bldg., Montreal, Que., ch. engr.

Ont., Toronto — PAPER FACTORY — Handmade Papers Ltd., subsidiary Don Valley Paper Co., Leaside, plant. $100,000.

Ont., Toronto—FACTORY—Packard Electric Co., Warren, O., cable and wire products plant. To exceed $40,000.

BIDS ASKED

N. J., Newark—FACTORY— See "Contracts Awarded."

N. Y., Brooklyn—PAINT PLANT—Corporation, c/o H. Holden, archt., 242 Franklin Ave., bids about Jan. 15, general contract paint manufacturing plant. Noted Oct. 9.

Okla., Oklahoma City—FACTORY—See "Contracts Awarded."

Pa., Johnstown — PLANT — See "Contracts Awarded."

CONTRACTS AWARDED

Ga., Columbus—MILL—Lockwood & Greene, engrs., Charlotte, N. C., hosiery mill addition, to A. K. Adams, 542 Plum St. N.W., Atlanta, for Archer Hosiery Mills. $200,000.

Ind., Indianapolis — FACTORY — Amer. Art Clay Co., 4717 West 16th St., rein.-con., brick, steel. $40,000. Owner builds.

Ind., Indianapolis—FACTORY—Piel Bros., 1515 South Dover St., general contract brick, steel, to Brown & Mick, 1020 East Michigan St. Est. $40,000.

Ind., Indianapolis—PLANT—E. F. Murbarger & Son, 1819 North Meridian St., 2 story, basement, 40 x 150 ft., brick, steel plant and display building, to W. P. Jungclaus & Co., 825 Mass. Ave. Est. $40,000.

Mass., Peabody — FACTORY — Korn Leather Co., 10 Walnut St., altering and constructing 1 story, irregular sized, brick, timber addition, concrete found., to L. Lowe, 6 Tremont Pl. Est. $40,000.

N. J., Newark—FACTORY and STORAGE—P. Gunne, 276 New Jersey R.R. Ave., 1 story, basement, 60 x 200 ft., brick, steel, factory, storage, 10-36 Haynes Ave., separate contracts. $40,000. C. A. Villano, 18 Nichols St., archt.

N. Y., Stapleton (sta. Staten Island) — BREWERY, etc. — Rubsam & Horrman Brewing Co., 191 Canal St., brewery, ice manufacturing, 191 Canal St., to J. McDermott, Stapleton. Est. exceeds $40,000. Noted Dec. 4.

Okla., Oklahoma City—FACTORY—Reagan Brick Co., A. W. Kenyon, pres., Hales Bldg., brick, tile, 64th St. and Oklahoma Ry., day labor. $250,000. Private plans.

Pa., Johnstown—PLANT—Bethlehem Steel Co., Bethlehem, alterations, improvements, day labor and separate contracts. To exceed $3,000,000.

Tex., Cuero—PACKING PLANT—Swift & Co., Packers and Exchange Aves., Chicago, Ill., and Cuero, 2 story, brick, rein.-con., plain found., to Johnson Constr. Co., Waco, $40,000. Noted Sept. 4.

Ont., Oshawa — FACTORY — Oshawa Industrial Foundation Ltd., c/o Oshawa Chamber of Commerce, 1 story, 100 x 150 ft., concrete, brick, steel. $60,000. Owner builds. C. C. Stenhouse, Oshawa, archt. Coulter Mfg. Co., c/o Coulter Copper & Brass Co. Ltd., 115 Sumach St., Toronto, lessee.

GARAGES

PROPOSED WORK

Calif., San Francisco—Macdonald & Kahn, Financial Center Bldg., plans by Bliss & Fairweather, Balboa Bldg., 2 story, basement, concrete, brick, Folsom St. near Main St. $300,000. U. S. Post Office Dpt., lessee.

Conn., Hartford—Goodrich Silvertown Co., 145 High St., soon lets contract 1 story, basement mezzanine, 30 x 128 ft. and 50 x 70 ft., brick, steel, concrete, super tire service station, Walnut and High Sts. $40,000. Private plans.

Mich., Detroit—Valvoline Oil Co., 2248 West Warren Ave. and Chrysler Bldg., New York, garage, storage and distribution building addition.

Mo., St. Louis—Amer. Ry. Express Co., 1730 Clark Ave., sketches garage, Spruce St., between 15th and 16th Sts. $150,000.

N. Y., Brooklyn — Lynkings Realty Co., W. Zorn, pres., 1366 White Plains Rd., New York, service garage, New Utrecht and 18th Aves. To exceed $70,000. **Maturity latter part February.** F. H. Klie, 250 Park Ave., New York, archt. Noted Nov. 20.

N. Y., New York—S. Mayer, 41 East 72nd St., sketches by C. Schaefer, 332 East 149th St., 7 story, 81 x 102 ft. service garage, 158 East 84th St. To exceed $150,000.

N. Y., New York—Sobol Bros. Holding Corp., 5th Ave. and 110th St., service station, greasing palace, West and Canal Sts. To exceed $40,000.

Pa., Greenville—Sterling Oil Co., R. S. Newton, in charge constr., Emienton, soon takes bids 1 story, brick service station, Penn and Main Sts. $40,000. H. C. Clepper, 103 Vandergrift Bldg., Pittsburgh, archt.

Va., Richmond — Gulf Refining Co., Frick Bldg., soon lets contract service garage, bulk oil storage, distribution tank farm, warehouse. To exceed $100,000.

BIDS ASKED

Me., Portland—Dec. 12, by Texas Oil Co., 17 Battery Pl., New York, garage, pump house, office. $40,000. Private plans.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Gary—Goodrich Silverton, Inc., general contract 60 x 100 ft., rein.-con., brick, steel, stone service station, 701 Adams St., to W. H. Stern, 574 Monroe St. Est. $40,000.

Mass., Arlington—Stuart Marshall Realty Co., 825 Beacon St., Newton, 1 story, concrete, steel service garage addition, to Allan Gillis Constr. Co., 315 Washington St., Newton. Est. $40,000. Noted Nov. 27.

N. Y., Brooklyn—H. Goldin, 1539 East 16th St., storage garage and service station, 16th Ave. and West 45th St., day labor and separate contracts. To exceed $85,000. J. J. Millman, 67 Court St., archt. Noted Nov. 20.

N. Y., Syracuse—W. H. Bissel, 109 South State St., 2-story commercial garage addition East Washington St., to Fellows & McGrath, 207 Fellows Ave., $40,000.

N. Y., Syracuse — Syracuse Lighting Co., South Warren St., service garage, Hiawatha Blvd., to J. D. Taylor Constr. Co., 115 South Salina St., $100,000.

O., Cincinnati—Owner, c/o Midland Building Co., Burnet Ave., 1 story, basement, rein.-con. garage, stores, plain found., McMillan St., to Midland Building Co., Burnet Ave., $150,000.

R. I., Providence — M. A. Gammino Realty Co., 718 Valley St., 2 story, 75 x 100 ft., rein.-con. garage, repair shop, office. $50,000. Owner builds. O. DiSaia, 15 Westminster St., archt.

W. Va., Charleston—Standard Oil Co. of New Jersey, Davidson Bldg., 2 story, 28 x 86 ft. and 1 story, 120 x 130 ft. service, repair garage and office building, to A. G. Higginbotham, Charleston Natl. Bank Bldg. Est. $100,000.

SHOPS AND FOUNDRIES

BIDS ASKED

Ind., Gary — SHOP, etc. — See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Gary—SHOP, etc.—Phillips Petroleum Co., rein.-con., brick machine shop, garage, 728 Colfax Ave., separate contracts. $40,000.

POWER PLANTS

PROPOSED WORK

Ariz., Tucson—Tucson Gas, Electric Light & Power Co., sketches power plant improvements, incl. 4,000 hp. diesel engine power plant extension, cooling tower, etc. $500,000. A. M. Pooler, genl. mgr.

Mass., Medford (br. Boston)—Malden Electric Co., 157 Pleasant St., Malden, 1 story, brick substation, Salem St. To exceed $40,000. C. H. Tenney Co., 38 Chauncy St., Boston, engrs.

Tex., Yoakum—City, large light plant, incl. complete system physical improvements, incl. extensions to lines, large dynamo or power unit. $200,000. Montgomery & Ward, Wichita, probable engrs.

CONTRACTS AWARDED

Kan., Kansas City—See "Unclassified."

Mo., Bethany—See "Unclassified."

Mo., Osborne—See "Unclassified."

Mo., Sikeston—City, general contract, 1 story, 40 x 80 ft., concrete brick, municipal light and power plant, to Fairbanks Morse Co., 217 South 8th St., St. Louis, $123,600. Contractor sub-let power plant building, to Sutterfield & Weltecke, Sikeston, $15,355; installing distribution system, switchboard, station wiring to R. H. Bouligny Co., Inc., Charlotte, N. C. Noted Nov. 13.

Pa., Oakmont—Duquesne Light Co., 435 6th Ave., Pittsburgh, brick substatica, incl. vaults, Allegheny Ave. and Hulton Rd., to Bylleshy Eng. & Management Corp., 435 6th Ave., Pittsburgh, engrs. and general contractors.

WAREHOUSES

PROPOSED WORK

Mass., Waltham—M. Tinkle, 20 Sun St., plans by Wm. Haines & Son, 32 Riverview Ave., 2 story, rein.-con. storage, concrete found., Sun St.

N. J., Newark—R. C. Bossert, Jr., 160 Market St., West Orange, warehouse, garage, Delevan Ave. $150,000. Architect not selected.

N. J., Perth Amboy—Greenspan Bros., 226 Washington St., sketches by Ballinger & Co., 12th and Chestnut Sts., Phila., Pa., 1 story, basement, brick, steel warehouse, plain found., Fayette and Reade Sts. $150,000. Noted Dec. 4.

Ont., Toronto — Canadian Natl. Ry., New Union Sta., T. T. Irving, ch. engr. (Central Region), New Union Sta., 2 story, brick, concrete, steel warehouse for handling fruit shipments, Yonge St. and Esplanade. $200,000.

BIDS ASKED

Conn., Hartford—New England Electric Co., 103 Allyn St., taking bids brick, steel, concrete storage and service building, Spring and Church St. extension. $75,000-$100,000. Westcott & Mapes, 139 Orange St., New Haven, archts. Noted Nov. 13.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Claremont—College Heights Orange & Lemon Assn., Ontario, 2 story, basement, 60 x 148 ft., rein.-con., hollow tile, steel joist storage plant, to C. T. Stover, 425 Armsley Square, Ontario, $35,000.

Mass., Boston—J. H. White & Sons Co., 102 Ash St., South Boston, 2 story, brick, steel warehouse, plain found., Ash St., to J. P. Clark, 385 Mt. Vernon St., Dorchester. Est. $50,000. Noted Aug. 21.

N. Y., Brooklyn — M. Solomon & Sons, Cooperage Co., industrial, storage and garage, Morgan Ave. and Scholes St., day labor. To exceed $40,000. B. Sackheim, 26 Court St., archt.

See proposal advertising on page 109

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AND . . .

. . . specification writers

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